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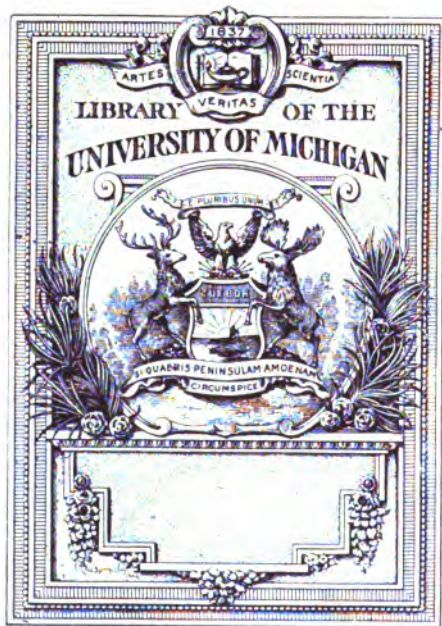
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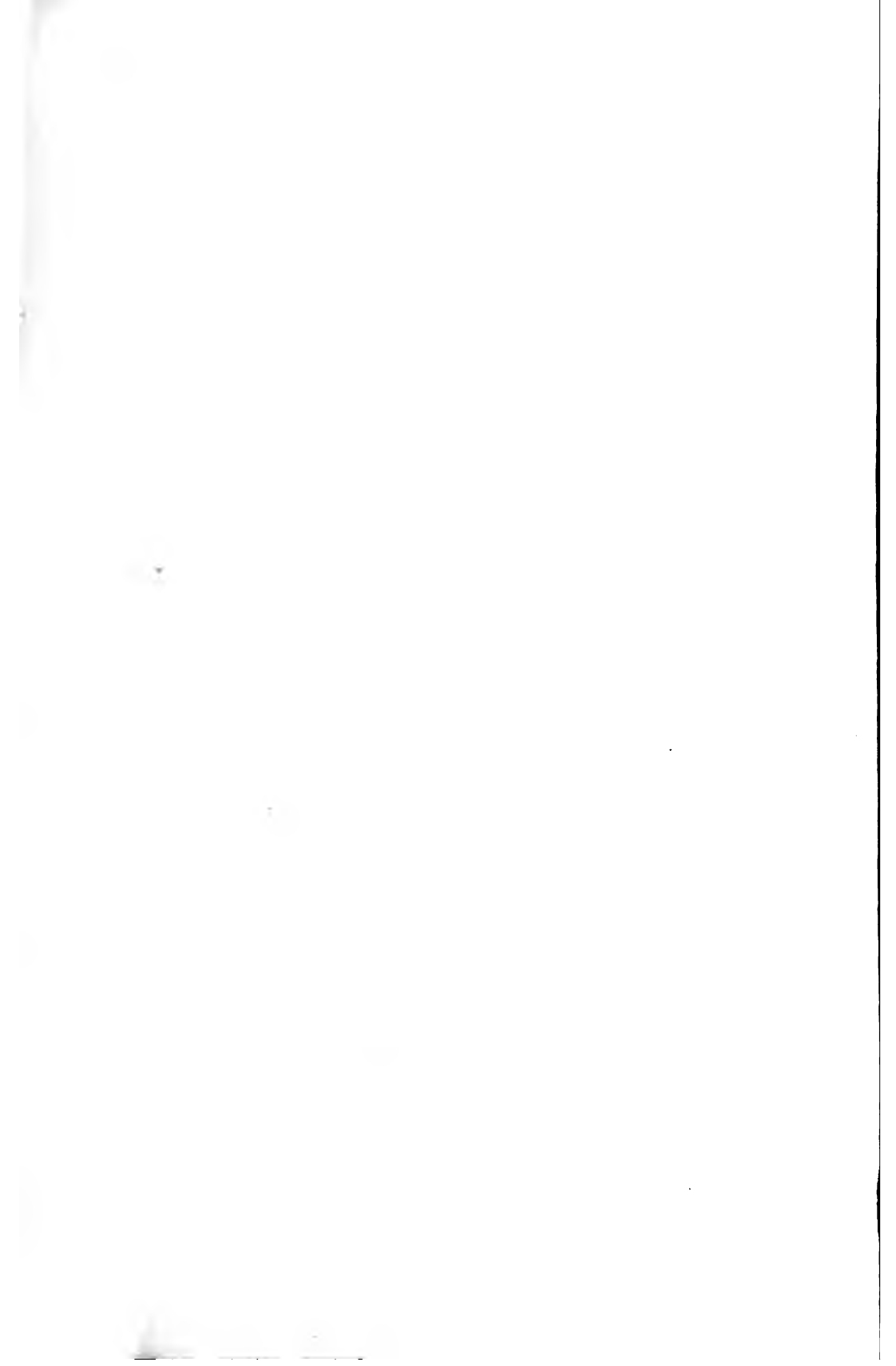


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**THIRD BIENNIAL REPORT**  
**OF THE**  
**KANSAS**  
**STATE HORTICULTURAL SOCIETY,**  
**FOR THE YEARS 1891-'93.**

**CONTAINING**  
**THE PROCEEDINGS OF THE ANNUAL MEETINGS**  
**IN 1891-'93.**

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**EDITED BY THE SECRETARY.**

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**VOL. XIX.**

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**PUBLISHED BY THE STATE.**



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**EDWIN H. SNOW, State Printer.**  
**1894.**

## LETTER OF TRANSMITTAL.

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SECRETARY'S OFFICE, KANSAS STATE HORTICULTURAL SOCIETY, }  
LAWRENCE, KAS., February 27, 1894. }

*To His Excellency L. D. LEWELLING, Governor of the State of Kansas :*

We are pleased to be able to submit to you herewith a copy of the third biennial report of the Kansas State Horticultural Society, and ask for it your careful examination.

While the fundamental principles which govern the practical working of the art of horticulture are concisely presented therein, the scientific requirements for their application are also prominently and quite fully presented, in simple and popular terms, that the masses engaged in the industry may readily comprehend and put them in practice.

The unfruitfulness of the orchards of the state during the last two years is only a repetition of similar occurrences in some of the most favored fruit regions of the United States, and there is ample evidence that the cause of these failures is similar in all those states; and to reach a conclusion as to the most successful and economic treatment to prevent a recurrence of such failures, the labors and research of the most talented and skillful scientists have been brought into requisition, both in the laboratory and the field. This work is being conducted at the agricultural experiment stations, which are specially equipped for such purposes; and, by persistent and careful experimentation, remedies have been found and the best methods for applying them determined and published to the people through station bulletins.

While the methods of treating the causes of such failures in crops are new, and not fully understood, so also are the causes new to a large portion of the culturists. Under such conditions, errors are likely to occur, and the results will not always be satisfactory. But time and continued practice will correct the errors, and bring success to the careful and intelligent manager.

The horticultural resources of our state are conceded to be of the best, when skillfully and intelligently developed. There are obstacles, in common with all the states, constantly occurring, which require time and effort to overcome; but our people have, in the past, proved themselves equal to all such as they have occurred, and have practically overcome them, and placed Kansas in the front rank of those of her sister states specially adapted to the production of the staple classes of fruits, and it is believed she will be able to sustain that prominence in the future.

Very respectfully, L. HOUK, *President.*

G. C. BRACKETT, *Secretary.*

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## FRUIT DISTRICTS.

### No. 1.—NORTHERN DISTRICT.

( Embraces the following counties.)

ATCHISON,	GOVE,	NORTON,	SALINE,
BROWN,	GRAHAM,	OSBORNE,	SHAWNEE,
CHEYENNE,	JACKSON,	OTTAWA,	SHERIDAN,
CLAY,	JEFFERSON,	PHILLIPS,	SHERMAN,
CLOUD,	JEWELL,	POTTAWATOMIE,	SMITH,
DECATUR,	LEAVENWORTH,	RAWLINS,	THOMAS,
DICKINSON,	LINCOLN,	REPUBLIC,	TREGO,
DONIPHAN,	LOGAN,	RILEY,	WALLACE,
ELLIS,	MARSHALL,	ROOKS,	WASHINGTON,
ELLSWORTH,	MITCHELL,	RUSSELL,	WYANDOTTE.
GEARY,	NEMAHA,		

### No. 2.—CENTRAL DISTRICT.

( Embraces the following counties.)

ANDERSON,	GREELEY,	LINN,	PAWNEE,
BARTON,	HAMILTON,	LYON,	RENO,
CHASE,	(North of Arkas. river),	MARION,	RICE,
COFFEY,	HARVEY,	McPHERSON,	RUSH,
DOUGLAS,	HODGEMAN,	MIAMI,	SCOTT,
FINNEY,	JOHNSON,	MORRIS,	STAFFORD,
FRANKLIN,	KEARNY,	NESS,	WABAUNSEE,
GARFIELD,	(North of Arkas. river),	OSAGE,	WICHITA.
GRAY,	LANE,		

### No. 3.—SOUTHERN DISTRICT.

( Embraces the following counties.)

ALLEN,	CRAWFORD,	HASKELL,	NEOSHO,
BARBER,	EDWARDS,	KEARNY,	PRATT,
BOURBON,	ELK,	(South of Arkas. river),	SEDGWICK,
HUTLER,	FORD,	KINGMAN,	SEWARD,
CHAUTAUQUA,	GRANT,	KIOWA,	STANTON,
CHEROKEE,	GREENWOOD,	LABETTE,	STEVENS,
CLARK,	HAMILTON,	MEADE,	SUMNER,
COMANCHE,	(South of Arkas. river),	MONTGOMERY,	WILSON,
COWLEY,	HARPER,	MORTON,	WOODSON.

## OFFICERS AND STANDING COMMITTEES FOR 1894.

## OFFICERS.

**President.**

L. HOUK, Hutchinson, Reno county.

**Vice President.**

MARTIN ALLEN, Hays City, Ellis county.

**Secretary.**

G. C. BRACKETT, Lawrence, Douglas county.

**Treasurer.**

F. HOLSINGER, Rosedale, Wyandotte county.

**Trustees.**

NORTHERN DISTRICT, E. J. HOLMAN, Leavenworth, Leavenworth county.  
 CENTRAL " SAMUEL REYNOLDS, Lawrence, Douglas county.  
 SOUTHERN " GEO. W. BAILEY, Wellington, Sumner county.

## STANDING COMMITTEES FOR 1894.\*

**Nomenclature and New Fruits.**

WM. CUTTER, Junction City.  
 W. T. JACKSON, Topeka.  
 J. F. MARTIN, Winfield.

**Botany and Vegetable Physiology.**

D. W. JACOBY, Abilene.  
 PHIL. S. CREAGER, Topeka.

**Entomology.**

PROF. E. A. POPENOE, Agricultural College.  
 FRANK HOLSINGER, Rosedale.  
 B. P. HANAN, Arlington.

**Orchard Treatment.**

E. J. HOLMAN, Leavenworth.  
 F. WELLHOUSE, Fairmount.  
 J. NIXON, Kellogg.

**Forestry.**

M. ALLEN, Hays City.  
 J. B. SCHLICHTER, Sterling.  
 E. T. DANIELS, Kiowa.

**Small Fruits.**

MISS A. BOWMAN, Leavenworth.  
 J. F. OECIL, North Topeka.  
 T. BASSLER, Geuda Springs.

**Floriculture.**

Mrs. P. B. BROOKS, Lawrence.  
 W. T. JACKSON, Topeka.

**Vegetable Gardening.**

E. F. WALTER, Wakefield.  
 H. MANWARING, Lawrence.  
 H. A. KAHART, Oxford.

**Handling Fruits.**

F. W. DIXON, Netawaka.  
 B. F. SMITH, Lawrence.  
 N. M. CHANDLER, Ottawa.

**Meteorology.**

T. B. JENNINGS, Lebo.

**Vineyards.**

WM. CUTTER, Junction City.  
 E. F. FISHER, Sterling.  
 L. HOUK, Hutchinson.

**Landscape Gardening.**

PROF. J. D. WALTERS, Agricultural College.

**Horticulture Connected with Farming.**

E. H. KERN, Mankato.  
 A. L. ENTSMINGER, Silver Lake.  
 J. F. MARTIN, Winfield.

**Geology and Soils.**

PROF. ROBT. HAY, Junction City.

**Ornithology.**

PROF. F. H. SNOW, State University.  
 PROF. D. E. LANTZ, Agricultural College.

**Experimental Horticulture.**

PROF. S. C. MASON, Agricultural College.

**Suggestions for the Advancement of Horticulture.**

SAMUEL REYNOLDS, Lawrence.

**Fungicides.****THEIR USES IN THE ORCHARD.**

DR. A. NEWMAN, Lawrence.

**THEIR USES IN THE VINEYARD.**

JAMES KANE, Lawrence.

**Insecticides.****THEIR USES IN THE ORCHARD.**

F. WELLHOUSE, Fairmount.  
 HOWARD ROBERTS, Perry.

**Novelties in the Nursery Trade.**

E. J. HOLMAN, Leavenworth.  
 A. O. GRIESA, Lawrence.  
 U. B. PEARSALL, Fort Scott.

**Needed Legislation.**

L. HOUK, Hutchinson.  
 T. T. TAYLOR, Hutchinson.  
 F. WELLHOUSE, Fairmount.

**Transportation.**

E. P. DIEHL, Olathe.

\* The appointment of these committees has been made with reference to their relation to the fruit districts as far as their investigations are affected by local influences, and are arranged in the order of the northern, central and southern districts; and each member of the committees is requested to report as chairman for his district.—SECRETARY.



## LIST OF MEMBERS.

## HONORARY MEMBERS.

(Enrolled in the order as conferred.)

N. J. COLMAN, . . . . .	St. Louis, Mo.	Prof. C. V. RILEY, . . . . .	Washington, D. C.
Dr. L. D. MORSE, . . . . .	St. Louis, Mo.	SAMUEL MILLER, . . . . .	Bluffton, Mo.
C. W. MURTFELDT, . . . . .	St. Louis, Mo.	Prof. S. T. KELSEY, . . . . .	Highlands, N. C.
Prof. F. H. SNOW, State University, . . . . .			Lawrence.
PRESIDENT'S OFFICE, Kansas Agricultural College, GEO. T. FAIRCHILD, . . . . .			Manhattan.
CHAIR OF CHEMISTRY AND MINERALOGY, Kansas Agricultural College, Prof. GEO. H. FAIRYER, . . . . .			Manhattan.
CHAIR OF BOTANY AND ZOOLOGY, Kansas Agricultural College, Prof. A. S. HITCHCOCK, . . . . .			Manhattan.
Prof. DAVID E. LANTZ, Kansas Agricultural College, . . . . .			Manhattan.
CHAIR OF HOUSEHOLD ECONOMY AND HYGIENE, Kansas Agricultural College, Prof. Mrs. NELLIE KEDZIE, . . . . .			Manhattan.
CHAIR OF HORTICULTURE AND ENTOMOLOGY, Kansas Agricultural College, Prof. E. A. POPENOE, . . . . .			Manhattan.
CHAIR OF INDUSTRIAL ART AND DESIGN, Kansas Agricultural College, Prof. J. D. WALTERS, . . . . .			Manhattan.
Prof. R. C. KEDZIE, Department of Chemistry, Michigan Agricultural College, . . . . .			Lansing, Mich.
Prof. A. J. COOK, Department of Entomology, Michigan Agricultural College, . . . . .			Lansing, Mich.
Prof. L. H. BAILEY, Chair of Horticulture, Cornell University, . . . . .			Ithaca, N. Y.
Prof. T. J. BURRILL, secretary American Society of Microscopists, . . . . .			Champaign, Ill.
Prof. S. A. FORBES, State Entomologist, . . . . .			Champaign, Ill.
Prof. J. A. LINTNER, State Entomologist, . . . . .			Albany, N. Y.
Prof. E. N. PLANK, . . . . .			Kansas City, Kas.
Prof. ROBT. HAY, Geologist, . . . . .			Junction City.

## LIFE MEMBERS.

(In the order and year enrolled.)

G. C. BRACKETT, . . . . .	Lawrence,	1868.	J. V. RANDOLPH, . . . . .	Emporia,	1881.
C. G. WICKERSHAM, . . . . .	Parsons,	1876.	JOHN CLOUGHERLY, . . . . .	Parsons,	1882.
Dr. J. M. DEBALL,* . . . . .	Paola,	1876.	JOHN S. HICKS, . . . . .	Roslyn, N. Y.,	1882.
Prof. E. GALE, . . . . .	Lake Worth, Fla.,	1876.	E. P. HARRIS, . . . . .	Lecompton,	1882.
H. E. VAN DEMAN, . . . . .	Washington, D. C.,	1876.	ED. BILLINGS, . . . . .	Freecott,	1883.
SECRETARY'S OFFICE, Manhattan Horticultural Society, . . . . .		1876.	Prof. E. A. POPENOE, Agri-		
FRED. WELLHOUSE, . . . . .	Fairmount,	1877.	cultural College, . . . . .	Manhattan,	1884.
ABNER ALLEN, . . . . .	San Diego, Cal.,	1877.	C. H. LONGSTRETH, . . . . .	Lakin,	1884.
SECRETARY'S OFFICE, Johnson County Horticultural Society, . . . . .		1877.	A. C. GIESA, . . . . .	Lawrence,	1885.
GEO. Y. JOHNSON, . . . . .	Dedham, Mass.,	1878.	H. MANWARING, . . . . .	Lawrence,	1885.
ROBERT MILLIKEN, . . . . .	Emporia,	1878.	S. W. MILES, . . . . .	Clay Centre,	1885.
A. A. ADAMS, . . . . .	Garnett,	1878.	M. R. MOSIER, . . . . .	Salina,	1886.
W. E. FOSNOT, . . . . .	Ocala, Fla.,	1878.	R. E. LAWRENCE, . . . . .	Wichita,	1886.
Dr. J. STAYMAN, . . . . .	Leavenworth,	1879.	J. A. CLEVELAND,† . . . . .	Madison,	1886.
A. N. GODFREY, . . . . .	Dayton, Wash.,	1879.	SAMUEL CUTTER, . . . . .	Vinton,	1887.
J. A. MOSHER, . . . . .	Scandia,	1879.	Dr. G. BOHRER, . . . . .	Chase,	1888.
E. P. DIEHL, . . . . .	Olathe,	1880.	J. W. ROBSON, . . . . .	Ablene,	1888.
JAMES MARVIN, D. D., . . . . .	Lawrence,	1880.	D. M. WRIGHT, . . . . .	Hutchinson,	1888.
T. C. HENRY, . . . . .	Denver, Colo.,	1880.	Hon. HENRY BOOTH, . . . . .	Larned,	1889.
GEO. T. FAIRCHILD, Prest.			Hon. T. T. TAYLOR, . . . . .	Hutchinson,	1889.
Agricultural College, . . . . .	Manhattan,	1880.	JOHN FULCOMER, . . . . .	Belleville,	1890.
CHAS. A. DOW, . . . . .	Burlington,	1881.	A. L. ENTSMINGER, . . . . .	Silver Lake,	1891.
			J. MENTCH, . . . . .	Winfield,	1891.

\*Deceased, 1893.

†Deceased, 1891.

NOTE.—The following list embraces those of the County Vice Presidents entitled to be enrolled as life members, in 1889, under the provisions of article III, amendment No. 4, of the constitution:

ALLEN, M., . . . . .	Hays City,	1889.	LITSON, W. H., . . . . .	La Cygne,	1889.
BISHOP, L., . . . . .	Osawatomie,	1889.	McKEE, JOHN, . . . . .	Marysville,	1889.
BROWN, G. B., . . . . .	Fredonia,	1889.	MOHLER, M., . . . . .	Osborne,	1889.
BUCKMAN, THOMAS, . . . . .	Topeka,	1889.	SHEFFIELD, C. H., . . . . .	Delphos,	1889.
CUTTER, WILLIAM, . . . . .	Junction City,	1889.	SCHLICHTER, J. B., . . . . .	Sterling,	1889.
HARRIS, F. B., . . . . .	White City,	1889.	SMITH, W. W., . . . . .	Le Roy,	1889.
HOLMAN, E. J., . . . . .	Leavenworth,	1889.	TAYLOR, E. A., . . . . .	Beloit,	1889.
KELSEY, O. C., . . . . .	Humboldt,	1889.	WILLIAMS, J. L., . . . . .	Kansas City,	1889.
LEACH, L. W., . . . . .	Kingman,	1889.			

List of County Vice Presidents entitled to life membership, in 1890:

BOGGS, THEO., . . . . .	McPherson,	1890.	HALL, M., . . . . .	Newton,	1890.
BYRAM, J. W., . . . . .	Cedar Point,	1890.	LEACH, JOS., . . . . .	St. Mary's,	1890.
BYRAM, E. T., . . . . .	Jewell City,	1890.	TRAFTON, N., . . . . .	Milford,	1890.
CLARK, J. G., . . . . .	Waveland,	1890.	WEIDMAN, J., . . . . .	Pleasant Valley,	1890.
COOK, THEO. F., . . . . .	Monrovia,	1890.	WILLIAMS, J. W., . . . . .	Holton,	1890.

List of County Vice Presidents entitled to life membership in 1891, 1892, and 1893:

BOWEN, P. C., . . . . .	Cherry Vale,	1893.	LATIMER, J. W., . . . . .	Pleasanton,	1892.
DOBBS, J. B., . . . . .	Antelope,	1893.	McLAREN, J. W., . . . . .	Sumnerville,	1892.
HARKNESS, D. C., . . . . .	Howard,	1893.	ROBERTS, H. R., . . . . .	Perry,	1893.
HANAN, B. P., . . . . .	Arlington,	1892.	SMITH, T. W., . . . . .	Baxter Springs,	1892.
HAYDEN, C. W., . . . . .	Thayer,	1893.	WELLS, T. C., . . . . .	Manhattan,	1891.
KEELE, A. R., . . . . .	Clay Centre,	1892.	WHEELER, JOSEPH, . . . . .	Nortonville,	1892.
KNOBLE, J. W., . . . . .	Woodruff,	1891.			

## ANNUAL MEMBERSHIP.

### Lady Members, 1892.

BERKEY, Mrs. C., . . . . .	Beloit.	GILLFILLAN, Mrs. N. U., . . . . .	Beloit.
BRUMAGE, Mrs. E., . . . . .	Beloit.	HALBERT, Mrs. L., . . . . .	Beloit.
CROWELL, Mrs. M. H., . . . . .	Beloit.	HAUSER, Mrs. M. J., . . . . .	Beloit.
CROWELL, Miss JESSIE, . . . . .	Beloit.	PAGETT, Mrs. S., . . . . .	Beloit.
DICKEY, Mrs. C. A., . . . . .	Beloit.	SEARGER, Mrs. S. S., . . . . .	Beloit.
ENSMINGER, Mrs. S., . . . . .	Beloit.	STACEY, Mrs. C., . . . . .	Topeka.
EVANS, Mrs. P. A., . . . . .	Beloit.	WOOD, Mrs. M. A., . . . . .	Beloit.

### Annual Members, 1892.

BERKEY, L., . . . . .	Beloit.	KILBOURNE, F.,* . . . . .	Minneapolis.
BRUMAGE, W. J., . . . . .	Beloit.	MAYOROFF, J. T.,* . . . . .	Bond.
BURSON, D. C.,* . . . . .	Topeka.	MARLATT, W., . . . . .	Manhattan.
CLARK, L. R., . . . . .	Simpson.	McGRATH, J. S., . . . . .	Beloit.
COMBS, GEO. W., . . . . .	Fort Scott.	PAGETT, L., . . . . .	Beloit.
DIXON, F. W.,* . . . . .	Netawaka.	PEARSALL, U. B., . . . . .	Fort Scott.
DOWNMAN, JOHN B., . . . . .	Joplin, Mo.	SEARGER, S. H., . . . . .	Beloit.
DOYLE, H., . . . . .	Beloit.	STOCKARD, W. R., . . . . .	Beloit.
DURKEE, A., . . . . .	Weston, Mo.	VAN ORSDALL, B. F.,* . . . . .	Silver Lake.
DUFF, JAMES, . . . . .	Beloit.	WALTER, E. F., . . . . .	Wakefield.
HALBERT, E., . . . . .	Beloit.	WAUGH, F. A., . . . . .	Topeka.
HILL, JOSEPH, . . . . .	Beloit.	WOLFERSPERGER, H. F.,* . . . . .	Minneapolis.

NOTE.—All the County Vice Presidents enrolled in the membership for 1894 were also members in 1892, by virtue of their office, excepting J. J. Alexander, E. Bowles, Isaac Clark, D. Doyle, E. J. Holmad, James Kane, C. A. Seaman, I. F. Talbot, H. Weaver, B. P. Hanan, and C. A. Kocher.

\* Delegate.

## Annual Members, 1893.

ALBRIGHT, P. H., . . . . .	Winfield.	JEWELL, C. W., . . . . .	Topeka.
BAKER, J. S., . . . . .	New Salem.	KENNEDY, W. J., . . . . .	Winfield.
BENSON, G. H., . . . . .	Haven.	MARTIN, J. F., . . . . .	Winfield.
BUCK, E. B., . . . . .	Winfield.	MASON, PROF. S. C., . . . . .	Agricultural Col.
COMBS, GEO. W., . . . . .	Fort Scott.	MUNGER, GEO. M., . . . . .	Eureka.
CREAGER, PHIL. S., . . . . .	Topeka.	NEWMAN, DR. A., . . . . .	Lawrence.
DOYLE, D., † . . . . .	Oswego.	ORDAWAY, G., . . . . .	Topeka.
GILLFILLAN, J. E., . . . . .	Olathe.	PEARSALL, U. B., . . . . .	Fort Scott.
HOWE, O. E., . . . . .	Winfield.	ROBBIN, J. W., . . . . .	El Dorado.
IRWIN, C. M., . . . . .	Wichita.	SHORT, J. P., . . . . .	Winfield. [Neb.
JOHNSON, J. J., . . . . .	El Dorado.	SLEITH, ASA, . . . . .	University Place,
JOHNSON, S. W. E., . . . . .	Winfield.	SMITH, B. F., . . . . .	Lawrence.

NOTE.—All the County Vice Presidents enrolled in the membership for 1894 were also members in 1893, by virtue of their office, excepting J. J. Alexander, N. M. Chandler, D. Doyle, Jas. Kane, C. A. Kocher, I. F. Talbot, and H. Weaver.

## Annual Members, 1894.

ALEXANDER, J. J.,* . . . . .	Norton.	HOLMAN, E. J.,* . . . . .	Leavenworth.
ANGUS, L. W.,* . . . . .	Lewis.	HOWARD, L. M.,* . . . . .	Girard.
BAILEY, JNO.,* . . . . .	Harper.	JONES, A. W.,* . . . . .	Salina.
BALDWIN, DR. D. O.,* . . . . .	Hewins.	KANE, JAS.,* . . . . .	Lawrence.
BALDWIN, F. M., . . . . .	Seneca.	KEEN, E. H.,* . . . . .	Mankato.
BALDWIN, S. J.,* . . . . .	Seneca.	KNODLE, J. W.,* . . . . .	Woodruff.
BAUM, G. M.,* . . . . .	Colby.	KOCHER, C. A.,* . . . . .	Coates.
BASSLER, T.,* . . . . .	Geuda Springs.	LONGSTRETH, C. H.,* . . . . .	Lakin.
BROCKLEY, J. C.,* . . . . .	Spring Hill.	McLAREN, J. W.,* . . . . .	Sumnerville.
BISHOP, L.,* . . . . .	Beagle.	MIKESELL, W. A.,* . . . . .	Atwood.
BOGGS, THEO.,* . . . . .	McPherson.	MORRISON, D.,* . . . . .	Greensburg.
BOON, CHAS. G.,* . . . . .	Ashland.	O'TOOLE, JNO.,* . . . . .	Devizes.
BOWEN, P. C.,* . . . . .	Cherry Vale.	PANCOAST, B. F.,* . . . . .	Iola.
BOWEN, E.,* . . . . .	Gove City.	PEARSALL, U. B.,* . . . . .	Fort Scott.
BROWN, W. L.,* . . . . .	Kingman.	PIXLEY, N. H.,* . . . . .	Wamego.
BURTON, S. W., . . . . .	Centralia.	PRITCHARD, L.,* . . . . .	Hill City.
CAMPBELL, J. E.,* . . . . .	Highland Stat'n.	RANDALL, J. C., . . . . .	Hamburg, Iowa.
CARSON, L.,* . . . . .	Anthony.	REYNOLDS, JOS.,* . . . . .	Farlington.
CHANDLER, N. M.,* . . . . .	Ottawa.	RICE, E. C.,* . . . . .	Augusta.
CLARK, ISAAC,* . . . . .	Oberlin.	ROBERTS, H. R.,* . . . . .	Perry.
COOK, W. J., . . . . .	Olathe.	SEAMAN, C. A.,* . . . . .	Sedgwick.
CRUSE, E. W., . . . . .	Leavenworth.	SIMPSON, JAS.,* . . . . .	Allen.
CUMMINS, H. H.,* . . . . .	Pratt.	SMITH, J. B.,* . . . . .	St. John.
CUTTER, WM.,* . . . . .	Junction City.	SMITH, THOS. W.,* . . . . .	Baxter Springs.
DANIELS, E. T.,* . . . . .	Kiowa.	SMITH, W. W.,* . . . . .	Le Roy.
DAY, R. H.,* . . . . .	Lyons.	SNYDER, DR. WM.,* . . . . .	Towanda.
DEAN, M.,* . . . . .	Bavaria.	SOUTHWICK, A.,* . . . . .	Biley.
DOBBS, J. B.,* . . . . .	Antelope.	SPOHR, G. E., . . . . .	Manhattan.
DOYLE, D.,* . . . . .	Oswego.	TALBOT, I. F.,* . . . . .	Conway.
DUNLOP, JAS.,* . . . . .	Detroit.	TAYLOR, P. S.,* . . . . .	Eckridge.
DURLAND, A. C.,* . . . . .	Centralia.	TRUX, ISAAO L.,* . . . . .	Delphos.
ENTSMINGER, A. L.,* . . . . .	Silver Lake.	VAN ORSDELL, B. F., . . . . .	Silver Lake.
ESPENLAUB, G. F.,* . . . . .	Rosedale.	WALTER, E. F.,* . . . . .	Wakefield.
FERRIS, H. L.,* . . . . .	Osage City.	WEATHERBY, S. S.,* . . . . .	Le Roy.
FREEMAN, D. S.,* . . . . .	Columbus.	WEAVER, H.,* . . . . .	Tribune.
GARDNER, O. A. A.,* . . . . .	Byron, Neb.	WELLS, THOS. C.,* . . . . .	Manhattan.
HANAN, B. P.,* . . . . .	Arlington.	WEIDMAN, J.,* . . . . .	Pleasant Valley.
HATCH, MRS. S.,* . . . . .	Wathena.	WHEELER, JOSHUA,* . . . . .	Nortonville.
HART, C. P.,* . . . . .	Rush Centre.	WILLIAMS, J. W.,* . . . . .	Holton.
HARKNESS, D. C.,* . . . . .	Howard.	WINTER, J. M.,* . . . . .	Irving.
HAWKINS, R. C.,* . . . . .	Marysville.	WOLVERTON, E. K.,* . . . . .	Barnes.
HAYDEN, C. W.,* . . . . .	Thayer.	YOUNG, H. H.,* . . . . .	Rice.
HILL, N.,* . . . . .	Clayton.		

\* County Vice Presidents.

† Delegate.

## CERTIFICATE OF INCORPORATION.

We, the undersigned citizens of Kansas, do hereby associate ourselves as a body corporate, to be known as the KANSAS STATE HORTICULTURAL SOCIETY, for the promotion of horticultural and pomological science in the state of Kansas.

The principal office or place of business of said Society shall be at the city of Lawrence, or such other place in the state of Kansas as the Society may designate at a regular meeting thereof.

The number of Trustees of said Society shall be seven, and such Trustees shall have power to make all necessary rules and by-laws for the government of said Society and the transaction of its business.

Said Society shall have succession, under the provisions of this charter and the laws of the state of Kansas, for the term of 999 years.

In witness of all which, we have hereunto set our hands and seals, at the city of Ottawa, in the county of Franklin, in said state of Kansas, this 15th day of December, A. D. 1869.

WM. TANNER, *Leavenworth.*

G. C. BRACKETT, *Lawrence.*

C. B. LINES, *Wabaunsee.\**

GEO. T. ANTHONY, *Leavenworth.*

WM. M. HOWSLEY, *Leavenworth.†*

J. STAYMAN, *Leavenworth.*

S. T. KELSEY, *Pomona.‡*

STATE OF KANSAS, }  
COUNTY OF DOUGLAS, } ss.

On this 15th day of December, 1869, before me, a notary public in and for said county, came William Tanner, of Leavenworth county, Charles B. Lines, of Wabaunsee county, William M. Howsley, of Leavenworth county, S. T. Kelsey, of Franklin county, George C. Brackett, of Douglas county, George T. Anthony, of Leavenworth county, J. Stayman, of Leavenworth, to me personally known to be the identical persons described in and who signed the above charter, and acknowledged the same to be their own act and deed for the purposes therein.

JAMES CHRISTIAN,

[SEAL.]

Notary Public, Douglas county.

I, W. H. Smallwood, secretary of the state of Kansas, do hereby certify that the foregoing is a true and correct copy of the original certificate of incorporation, filed in my office December 20, A. D. 1869.

In testimony whereof, I have hereunto subscribed my name and affixed the great

{ GREAT SEAL }  
{ OF KANSAS. }

seal of the state. Done at Topeka, this 29th day of August, A. D. 1871.

W. H. SMALLWOOD, *Secretary of State.*

\*Deceased, 1891.

†Deceased, 1879.

‡Highlands, N. C.

## CONSTITUTION.

ARTICLE I. This association shall be known as the KANSAS STATE HORTICULTURAL SOCIETY.

ART. II. Its object shall be the advancement of the science and art of horticulture.

ART. III. Its membership shall consist of annual members, paying an annual fee of \$1; of life members, paying a fee of \$10 at one time; and of honorary members, who shall be persons only of distinguished merit in horticulture, and shall be elected to membership by a vote of the Society. [See amendments Nos. 1, 2, 3, 4, 5.]

ART. IV. Its officers shall consist of a President, Vice President, Secretary, and Treasurer, who shall be elected by ballot at each annual meeting of the Society, and shall hold their office for the term of one year, or until their successors shall be elected. They shall perform the duties usually devolving upon such officers, and shall be *ex officio* members of the Board of Trustees, consisting of the above-named officers and three other members, who shall be elected and hold their term of office as the other officers. Said Board shall, under the direction of the Society, manage all its affairs. [See amendments Nos. 6, 7.]

ART. V. It shall hold an annual meeting in the month of December, and a semi-annual meeting in the month of June, at such time and place as the Society or Board of Trustees may direct. [See amendment No. 8.]

ART. VI. This constitution may be amended at any annual meeting of the Society by a two-thirds vote of the members present.

*[Additional article, adopted at the seventh annual meeting, December 2, 1872.]*

ART. VII. There shall be a Vice President annually appointed from each county in the state, whose duty it shall be to organize local horticultural societies in their respective counties, whenever practicable; to report at each annual meeting on the general subject of fruit culture in their respective counties; and to look after the general interests of horticulture in their particular localities.

*[Additional article, adopted at the sixteenth annual meeting, December 5, 1882.]*

ART. VIII.—SECTION 1. The legislative body of the Society shall consist only of life members, Vice Presidents of each county, and two delegates from each district and county horticultural society which shall have complied with the requirements of amendment 2 of article III, adopted at the ninth annual meeting, held December 15, 1875.

SEC. 2. That all provisions heretofore adopted as amendments to or otherwise affecting the constitution, conflicting with these amendments and article VIII, be and the same are hereby repealed.

*[Additional article, adopted at the seventeenth annual meeting, December 5, 1882.]*

ART. IX. The Secretary or Treasurer of the Society shall have power to appoint a deputy for their respective offices, who may, under the instructions of the principal, and in his name, perform any and all the duties pertaining to said office.

*[Additional article, adopted unanimously, at the nineteenth annual meeting, December 1, 1885.]*

ART. X.—SECTION 1. It shall be the duty of the members of this Society at all times to exert their influence to protect its interests, and promote the objects for which it was organized.

SEC. 2. If any member shall, at any time or place, by words or actions, willfully seek to injure this Society, or any of its members, or manifest an inimical spirit

toward it, or be guilty of any grossly improper conduct, said member shall be deemed guilty of a violation of section 1 of this article, and on conviction thereof shall be reprimanded, suspended, or expelled.

**Sec. 3.** For any of the offenses specified in the foregoing section, charges in writing shall be preferred by any member or officer cognizant of the offense, against the offending person, which must be filed in the Secretary's office; and said person accused shall be tried under the charges by the Board of Trustees—notice of the day and place of trial being given the accused, together with a copy of the charges, at least 10 days prior to trial. It shall be the duty of the Board of Trustees, within 10 days after the closing of the trial, to give the accused, through the Secretary of the Society, a written notification of the judgment in the case, and, if convicted, the grade of punishment attaching to the judgment.

**Sec. 4.** Any person tried and convicted of an offense may, within 10 days from the day notice was given him of such judgment, appeal to the Society, by filing with the Secretary a written notice of such appeal, and a concise statement of the point or points on which the appeal is taken, or be barred from any further action—the judgment of the Board becoming final. Such appeal shall be tried before the legislative body of the Society at its next regular meeting, but only upon a transcript of the evidence introduced during the trial before the Board. The judgment of the Society shall be final.

**Sec. 5.** A conviction under the foregoing sections shall not debar any person from the rights and privileges of membership for a longer period than three years, excepting in cases of expulsion and continued disloyalty—in which case it shall be perpetual. Disabilities may be removed at any subsequent regular meeting by a two-thirds vote of the legislative body of the Society, on the grounds of good behavior, and pledges of strict loyalty thereafter.

#### AMENDMENTS.

[No. 1.—At the fifth annual meeting, December 19, 1871, article III was amended as follows:]

**Resolved,** That article III of the constitution be so amended that all annual memberships shall expire on the morning of the second day of the next annual meeting, and all semiannual memberships shall expire on the morning of the second day of the next semiannual meeting.

[No. 2.—At the ninth annual meeting, December 16, 1876, article III was amended as follows:]

Ladies attending the meetings of the Society may become members without fee; and two delegates from each of the district horticultural societies, and one delegate from other auxiliary horticultural societies organized under the general statutes of the state of Kansas, attending the meetings of the Society, shall be entitled to a membership without payment of the usual fee.

[No. 3.—At the tenth annual meeting, December 5, 1878, article III was amended as follows:]

**SECTION 1.** Of life members paying a fee of \$10 in four annual installments of \$2.50 each.

**Sec. 2.** That the office of secretary of any district, county and local horticultural society may be made a perpetual membership, upon the terms provided for a life membership.

[No. 4.—At the thirteenth annual meeting, December 16, 1879, article III was amended as follows:]

That any person who shall have performed the duties of a County Vice President under the provisions of article VII of the constitution for one year shall be enrolled an annual member; and that when such services shall have been rendered for the term of 10 years, consecutive or otherwise, such person shall be enrolled as a life member, and entitled to all the benefits of such membership.

[No. 5.—At the *stateenth* annual meeting, December 5, 1882, article III was amended as follows:]

Any of the aforesaid memberships may be, *for cause*, conferred by a vote of the Board at any of its called meetings, subject to confirmation by the Society at the following annual meeting.

[No. 6.—At the *sixteenth* annual meeting, article IV was amended as follows:]

Its officers shall consist of a President, Vice President, Secretary, and Treasurer, who shall be elected by ballot at the annual meetings, and hold their term of office for two years, dating from the first day of July next following the annual meeting at which they were elected. They shall perform the duties usually devolving upon such officers, and shall be *ex officio* members of the Board of Trustees, consisting of the above-named officers and three other members, who shall be elected by ballot at an annual meeting, and hold a term of office for three years from the date of election thereafter. The present Trustees shall hold their term of office as follows: The first Trustee for a term of one year, the second for a term of two years, and the third for a term of three years, from the date of election; and hereafter at each annual meeting there shall be elected one member of said Board of Trustees, to fill the office of the outgoing member. All the officers shall hold their respective offices until a successor is elected.

[No. 7.—At the *seventeenth* annual meeting, December 5, 1883, article IV was amended as follows:]

The Board of Trustees shall have power to fill any vacancy occurring in the offices provided for in article IV of the constitution, between the annual meetings of the Society; and any officer so appointed shall hold his respective office until the next succeeding annual meeting, or until a successor shall be elected by the Society.

[No. 8.—At the *twenty-second* annual meeting, December 4, 1888, article V was amended as follows:]

This Society shall hold an annual meeting in the month of December, and may hold a meeting during the growing season of each year, at such time and place as the Society or Board of Trustees may direct.

STATE LAWS RELATING TO HORTICULTURE.<sup>1</sup>

## GAME LAW.

[CHAPTER 97, SESSION LAWS OF 1898.]

AN ACT for the protection of birds and naming what birds shall not be killed, and prescribing punishment for the violation of the provisions of this act, and to repeal paragraphs 3195, 3196, 3198, 3199, 3200, 3201, 3202 and 3203 of the General Statutes of 1889.

*Be it enacted by the Legislature of the State of Kansas:*

SECTION 1. It shall be unlawful for any person or persons, at any time to catch, kill, shoot, trap or ensnare any partridge, prairie chicken, quail, grouse, pheasant, oriole, meadow lark, redbird, mocking bird and bluebird: *Provided*, That no provisions of this act shall apply or interfere with persons who may have in their possession or raise for sale any birds as pets, or may at any time catch, kill or entrap any of the birds mentioned in this section on his or her own premises, controlled by such person for his or her own use.

SEC. 2. It shall be unlawful for any person, company or corporation, at any time, to buy, sell or barter within the state of Kansas, any bird or birds named in section one of this act, except the song birds mentioned in section one of this act. The having in possession, by any person, company or corporation, of any birds named in section one of this act, except the song birds mentioned in section one of this act shall be deemed *prima facie* evidence of the violation of this act.

SEC. 3. Any person, company or corporation found guilty of violation of any of the provisions of this act, shall be deemed guilty of a misdemeanor, and upon conviction thereof before any court of competent jurisdiction, shall be fined in a sum not to exceed twenty-five dollars, for each and every offense, and costs, together with attorney's fee of ten dollars, and shall be committed until such fine, costs, and attorney's fee shall be paid.

SEC. 5. It shall not be necessary to prove on the trial, or to state in the complaint, the true or ornithological name of the bird caught, killed, shot, trapped, ensnared or had in possession in violation of this act.

SEC. 6. The provisions of this act shall not apply to any person who shall catch or kill any wild bird or birds, for the sole purpose of preserving them as specimens for scientific purposes: *Provided*, That in a prosecution for a violation of any of the provisions of this act, it shall not be necessary for the prosecution to set up or prove that the killing, catching or having in possession of any wild bird was not done for scientific purposes.

SEC. 7. That chapter forty-five (45) of the General Statutes of 1889, relating to game, being paragraphs 3195, 3196, 3198, 3199, 3200, 3201, 3202, and 3203 thereof, and all acts and parts of acts inconsistent herewith, be and the same are hereby repealed.

SEC. 8. This act shall take effect on and after its publication in the statute book.  
Approved March 11, 1898.



## PUNISHMENT FOR DECEPTION IN SALE OF FRUIT TREES, ETC.

[GENERAL STATUTES OF 1889, PARAGRAPH 2437, PAGE 723.]

AN ACT to punish misrepresentations and deception in the sale of fruit, shade or ornamental trees, vines, shrubs, plants, bulbs, and roots.

*Be it enacted by the Legislature of the State of Kansas:*

SECTION 1. Any person or persons who shall misrepresent, deceive, or defraud any person or persons in the sale of any fruit, shade or ornamental tree or trees, or any vine, shrub, plant, bulb, or root, by substituting inferior or different varieties, or who shall falsely represent the name, age or class of any such fruit, shade or ornamental tree or trees, or any vine, shrub, plant, bulb, or root, shall be guilty of a misdemeanor, and on conviction be fined not less than ten dollars nor more than two hundred dollars, or by imprisonment in the county jail not less than thirty days nor more than six months, or by both such fine and imprisonment, and shall be liable to the party or parties damaged or injured thereby in treble the amount of all damages sustained, to be recovered in any court having jurisdiction thereof.

SEC. 2. This act shall take effect and be in force from and after its publication in the official state paper.

Approved February 19, 1886.

## TRESPASSES.

[GENERAL STATUTES OF 1889, PARAGRAPH 7157, PAGE 2174.]

AN ACT to prevent certain trespasses.

*Be it enacted by the Legislature of the State of Kansas:*

SECTION 1. If any person shall cut down, injure, or destroy, or carry away any tree placed or growing for use, shade, or ornament, or any timber, etc., etc., the party so offending shall pay the party injured treble the value of the thing so injured, etc., with costs, and shall be deemed guilty of a misdemeanor, and shall be subjected to a fine not exceeding five hundred dollars.

Approved March 8, 1868.

### Obituary.

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**J. M. DeBALL, Paola, Miami County.**—Born October 17, 1824, at Kingston, Pa.; died March 22, 1893, at his residence near Paola, Kas.

Doctor DeBall was a self-educated physician, deriving the means to meet the expenses by hard labor, obtaining a postgraduate diploma in New York.

He married Miss Mary Jane Reed, at Indianapolis, Ind., January 1, 1848, who died October 3, 1850. On March 25, 1854, he was again married, to Miss Hannah A. Ballard, and went immediately to Texas, locating at Waco, engaging in the drug business until the civil war became imminent, when he returned to Illinois, locating near Quincy, and followed his profession until war was declared, when he received the appointment of assistant surgeon in the Thirty-eighth Illinois regiment, in which he served until the close of the war.

In 1872, he moved to Kansas and settled on the farm where he died. He was an enthusiastic horticulturist, and was one of the first three Kansans to take a life membership in the Kansas State Horticultural Society. He was an earnest supporter of the interests of state horticulture, and devoted himself to the care and cultivation of his orchards, in which he took much delight.

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**J. L. WILLIAMS, Holton, Jackson County.**—Born November 13, 1819, in Belmont county, Ohio; died October 20, 1892, at Holton.

Doctor Williams was born and raised on a farm, receiving only a common-school education. Arriving at manhood, he taught school for several years, and then studied under Doctor Tinker, a successful physician.

In 1841, he was married to Miss Lucinda Shephard, who died in 1845, childless. In 1847, he married Miss Margaret Keever, who died in 1848, leaving an infant son. He then turned his attention to the practice of medicine. In 1849, he married Miss Elizabeth Whitcraft, a farmer's daughter, with whom he lived until his death. He moved to Holton in 1866, and engaged in farming near the city. In 1884, he moved to Alabama, and engaged in fruit culture, shipping the products to northern markets. After a few years he returned to Holton.

He served as representative in the Kansas legislature during the terms for 1870 and 1871.

During the late civil war, he enlisted as a private in company B, Thirty-first Ohio infantry, and afterwards was commissioned lieutenant and captain. In 1863, health failing, he resigned. Recovering his health, in 1864 he enlisted in the 100-day service, and was commissioned major.

He was affable and companionable, and made extensive acquaintance and many warm friends, who will ever hold him in fond remembrance.

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**J. A. OLEVELAND, Madison, Greenwood County, Kansas.**—Born at Royalton, Windsor county, Vermont, November 5, 1821; died at Madison, Kas., August 12, 1891.

January 22, 1842, he married Ruth Eaton, of Tonbridge, Vt., with whom he lived for nearly a half century.

In the year 1858, he entered upon the active work of the ministry, and to the

close of his life he was an earnest worker in the vineyard of his Master, often filling places of usefulness and trust.

In the month of April, 1877, he settled in Madison, Kas. Selecting a piece of land suited to his taste, he built himself a habitation, and engaged at once in horticultural pursuits. Success from the beginning seemed to mark his labors, and, in a few short years, the forbidding hillside was transformed into a garden of splendor, where a horticultural enthusiast could find rest for his soul. Mr. Cleveland loved the earth, for God made it. He wrested from its bosom the good cheer which made his home the resort of the true lover of fruits, flowers, and the hospitality of congenial spirits.

Early identifying himself with the horticultural society of his adopted state, of which he became a life member in 1886, he continued one of its most active members until death closed his labors.

A notice of the funeral, published in the *Madison News*, thus beautifully describes the closing exercises at the home:

"At the home, a large company of friends and citizens gathered; and there, under the cooling shadows of the stately trees, of his own planting, before the bowed heads of the tasseled corn, in sight of the fruitage fully ripe—fit emblem of his life complete—Father Cleveland rested."

PROCEEDINGS  
OF THE  
TWENTY-FIFTH ANNUAL MEETING,

HELD AT  
BELOIT, MITCHELL COUNTY, KANSAS,  
DECEMBER 8, 9, AND 10, 1891.

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MORNING SESSION.

BELOIT, December 8, 1891.

THE morning session was called to order by Pres. L. Houk, at 10 o'clock A. M., Tuesday, the 8th of December, who addressed the Society on its past work, and urged a due consideration of the present condition of the industry and the requirements for future success. The published program was then taken up, and the Secretary's annual report, being first in order, was delivered, as follows:

SECRETARY'S ANNUAL REPORT.

MR. PRESIDENT AND MEMBERS: I am again before you to perform a pleasing duty required of this office annually, and while in its performance I may wander into various lines, I will confine myself within the field of horticulture and the affairs of the Society.

The season just closing has been one of remarkable variations, pleasing in some respects but very annoying in others. It has been remarkable in the production of a heavy crop of peaches, pears, and of the small fruits, and very annoying in the prevalence of fungous organisms, which attacked the apple, peach, grape, and raspberry, causing quite a heavy injury to the crops in their market value.

The year of 1891 will be remembered as a remarkable peach year in Kansas, and an exceptional one. Throughout the entire state, wherever the trees were in fair condition, the crop has been immense, and our people have for once had full satisfaction from this universally loved fruit. Even the "arid, barren plains" in western Kansas have yielded a heavy crop, rivaling that of the eastern portion in quality of its product, and, of the budded sorts, equaling that of the noted peach districts of Delaware and New Jersey. In the Denver market it outsold the product from California. 'T is true that thousands of bushels of poor fruit were grown on seedling trees, where choice varieties would have succeeded. The pear crop was heavy wherever the trees had been properly cared for, and its quality was superior.

Blight was unusually light in the eastern portion of the state, where, it would

seem, this disease is disappearing. But in the apple-scab fungus we have an enemy to be feared more than the pear blight. It is, however, proving more susceptible to methods of treatment for its suppression, and we have evidence that ere long it will be under our control. This is a very important matter, demanding the close study and experimentation of all apple orchardists.

Spraying for the destruction of insects is becoming quite general, and, from the reports made to this office from various portions of the state, the results are very encouraging. With the novice and those neglectful of thorough attention to the details of the treatment, it may not be as successful as desired. As the Codlin Moth (apple worm) is two-brooded in this climate, it is of the greatest importance that the most thorough attention be given to the destruction of the first brood, which appears with the dropping of the flower leaves, for just in proportion to the extent of its destruction will be the number of the second brood.

#### EXECUTIVE WORK OF THE BOARD AND THIS OFFICE.

A meeting of the board was held during the annual meeting of the Society at Topeka, on December 4, 1890, at which time the chairs of the standing committees were filled, as published on page 5 of the second biennial report. The second meeting was held at Topeka, on August 27 following, for the purpose of adopting measures for cooperating with the state managers of the World's Columbian Exposition, to be held at Chicago, in 1893.

#### COUNTY HORTICULTURAL SOCIETIES.

Since our last annual meeting, Barber, Pratt and Ottawa counties have each organized societies, and a local society has been organized at Altamont, Labette county.

#### CORRESPONDENCE.

[From C. L. Myers, Ellsworth.]

SEPTEMBER 6, 1891. *Dear Secretary:* There are several tree peddlers canvassing in this county. They claim that every tree in the county is black at the heart, because they had not been propagated on whole roots; that the present thrifty condition of thousands of trees was deceptive; that such trees could live but a short time longer. This argument was used to induce men who had good young orchards to plant more. They also claim that their trees were on whole roots; when the grafts were set they were set very deep, so they would root from the clon, and that after the clon was well rooted they dug down and severed it from the seedling root; that this process *hybridized* the trees, so they were hardier, etc. This looks too ridiculous to you or myself to call for any notice; but there are many men who have no idea about the manner of propagating trees, who are the more easily led to believe such stuff from their failures in growing fruit here, and from their great desire to succeed are willing to pay any prices for trees that they believe to be better than what they have been planting.

#### SOME FACTS WORTHY OF YOUR CONSIDERATION.

The edition of our published reports in 1872 was 100 copies of 80 pages each. As years passed the edition annually increased, until in 1886 it numbered 8,000 copies of 312 pages. It was then that the legislature forced their publication into a biennial issue, and the first biennial report numbered 492 pages and 8,000 copies. The second biennial report, the last published, was restricted to a cost not to exceed 80 cents per copy, and the edition was cut down to 5,000 copies. The third biennial, which is yet to be published, will be an edition of only 2,500 copies, to meet the demands of a state having a population of 1,500,000. If this edition should be distributed to the counties in a ratio according to population, as heretofore, you can easily discern how very few will be furnished the people of some of them.

#### LIST OF COUNTY VICE PRESIDENTS

Promoted, on account of service, to a life membership, by the provisions of the constitution, in 1891: Theodore Boggs, McPherson; J. W. Byram, Cedar Point; E.

T. Byram, Jewell; J. G. Clark, Waveland; Thos. F. Cook, Monrovia; M. Hall, Newton; Jos. Leach, St. Mary's; N. Trafton, Milford; J. Weidman, Pleasant Valley; J. W. Williams, Holton.

Respectfully submitted,

G. C. BRACKETT, *Secretary.*

[NOTE.—See Department of Finances for finance report.—SECR.]

On motion, the report was unanimously adopted.

#### TREASURER'S REPORT.

The Treasurer's annual report was then read, and, on motion, referred to the Auditing Committee. (See Department of Finances.)

#### COMMITTEES APPOINTED.

Special committees were then appointed, as follows:

*On Credentials.*—Wm. Cutter, F. A. Dixon, and W. Marlatt.

*On Constitution.*—F. Wellhouse, F. Holsinger, and Wm. Cutter.

*On Membership.*—S. H. Dodge, F. Holsinger, and E. A. Taylor.

*On Program.*—F. Holsinger, E. A. Taylor, and Van E. Butler.

*On Exhibited Articles.*—Wm. Cutter, A. Durkee, and F. Holsinger.

*On Auditing of Accounts.*—F. Wellhouse, Alex. Spiers, and F. Holsinger.

*On Resolutions, Reports, and Addresses.*—D. C. Burson, F. A. Dixon, E. H. Kern, and J. L. Soule.

#### AFTERNOON SESSION.

TUESDAY, December 8, 1891.

Reports of delegates on crops, condition of orchards, etc., in 1891, and prospects for 1892:

##### DICKINSON COUNTY.

J. M. SHEPPERD, Abilene: All classes yielded a fine crop of fruit excepting pear, which was moderate; currant, poor, owing to the prevalence of the "currant worm." In a few orchards blight attacked the apple and pear trees.

##### GEARY COUNTY.

WM. CUTTER, Junction City: Crops were good of all classes of fruits. Grapes were a very heavy crop of all varieties under cultivation. Blight was prevalent on some varieties of apple trees, especially the Russian sorts, and among pear trees the Kieffer suffered severely.

##### JACKSON COUNTY.

F. W. DIXON, Netawaka: Crops—apples, fair, in orchards that had been sprayed; peaches and plums (Wild Goose), heavy; blackberries, heavy; currants, good; grapes, strawberries, raspberries, about half a crop. All well-grown fruit brought a good price. Russian apricot trees are short-lived in the county. Budded peach trees yielded heavily.

##### JEWELL COUNTY.

M. W. WHITNEY, Jewell: Crops were fine of all classes, both in yield and quality. Apples were noticeably free of worms. Prospects for 1892, good.

##### LEAVENWORTH COUNTY.

F. WELLHOUSE, Fairmount: Crops of all classes good, excepting the apple, which was not heavy. Budded peach trees bore a good crop. Spraying has almost en-

tirely destroyed the apple worm (Codlin Moth), but the treatment fails to destroy the Apple Curculio.

#### MITCHELL COUNTY.

J. S. McGRATH, Beloit: Crops—apples, uncommonly heavy; grapes, the Concord very heavy; cherries, plums, and all classes of small fruits, good, excepting the strawberry. I am confident that it will be grown successfully in the county in the future. The season has been favorable to plant growth, which promises well for 1892; but as most of our orchard fruits are alternate bearers, the crop may not be heavy.

#### CLAY COUNTY.

E. F. WALTER, Wakefield: All varieties of fruit the past season matured a full crop, the largest all-round crop on record in this section. Strawberries and grapes were seriously injured upon low ground by a late frost in May, but the loss was not sufficient to affect the general crop. The heavy spring rains matured an enormous crop of strawberries; many patches neglected for years produced an abundance of berries, equal in size and appearance to the product of the most carefully-attended beds. Raspberries and blackberries also bore abundantly, even Kittatinny and Early Harvest blackberries were bent to the ground with loads of fruit. Souhegan raspberry withstands summer drought and winter's cold better than any variety we have tested. Cherries gave an immense crop; English Morello surpassed itself, Ostheim fruited well, Montmorency was also loaded. Pears bore the largest crop yet harvested in this county; Howell, Bartlett, Angouleme, Louise Bonne, Seckel, Kieffer, Clapp's Favorite and Flemish Beauty all bore full crops, and but little blight. Peaches promised a great crop, but owing to the dry summer a large proportion were unmarketable. During early winter we endeavored to try Professor Popenoe's method of laying down peach trees and covering with hay, but gave up the effort as being quite impracticable, except with very small and young trees. Our trees being headed low, we bent the lower limbs to the ground, staked them, and covered well with hay, but owing to the mildness of the winter we cannot say at present whether the method is a success; but this hay lying around the trees as mulch gave us a full crop of fine peaches. Grapes gave a great crop, the winter being so mild the tenderest varieties came through uninjured. Mildew appeared in some vineyards, doing considerable injury. We were not troubled. Apples bore an abundant crop; nearly all varieties bore freely, Ben Davis in every orchard being loaded; Missouri Pippin and Winesap also bore very full. The dry summer has clearly demonstrated the necessity of plowing the orchard. Where orchards have been neglected or sown down to grass the fruit was only fit for the cider mill. Twig blight was very prevalent among apple trees this year, doing considerable damage to young trees. The wood growth of all varieties of fruit trees has been good. The fruit crop for next year bids fair to be light; most varieties that have borne so abundantly have made but few fruit buds. The prospect for small fruits is at present good.

#### OSBORNE COUNTY.

Hon. M. MOHLER, Topeka: Reported the horticulture in the county in good condition at the present time, and the future promising of successful results, equal to any of the surrounding counties.

#### OTTAWA COUNTY.

(Condensed report of several delegates.) Crops of all classes, good to heavy. The Snyder blackberry is an objectionable sort, owing to its poor quality and tendency to dry up on the canes. The Kittatinny does better, and has not been attacked with the "orange-colored rust" complained of in some localities. The Codlin Moth was not as prevalent as heretofore.

**RILEY COUNTY.**

**W. MARLATT, Manhattan:** Crops of all classes heavy, and sold readily at good prices. Pear trees suffered severely from the blight. Even the Seckel, regarded as least liable, suffered with the other varieties. The planting during the spring was large and very successful.

**SHAWNEE COUNTY.**

**D. C. BURSON, Topeka:** Crops of all classes heavy, excepting apples, raspberries, and strawberries. These bore a fair crop of excellent quality. Budded peach trees yielded a good crop, which brought good prices. The Mariana plum nearly all rotted on the trees. Spraying with insecticides and fungicides has been successful in results. Blight has not attacked the apple, but large pear trees, were killed by it.

**MR. SECREST:** The Bubach and Haviland, fertilized with Captain Jack strawberry, are the best sorts.

**WASHINGTON COUNTY.**

**E. K. WOLVERTON, Barnes:** Crops — apples, cherries, peaches, good to heavy. The latter rotted heavily before ripening. Pear-tree blight was prevalent, and did much injury; but I would recommend planting pear trees, as some good crops will be obtained.

**E. J. WEEKLY, Bond:** Crops of raspberry and blackberry, good; strawberry, light. Grapes did not mature, owing to cold, wet weather about ripening time.

**WYANDOTTE COUNTY.**

**F. HOLSINGER, Rosedale:** Crops have not been equal to former years. Apples, one-third of an average yield. Red currants and gooseberries do well. Grapes were heavy where not injured by hail. Strawberries: Captain Jack is a fine variety for shipping; the Jessie, Bubach No. 5 and Sharpless are too soft. Raspberries were a light crop; Gregg and Hopkins are the best sorts; for family use the Shaffer is decidedly preferable. Blackberries: Taylor and Snyder are good sorts; the Kittatinny is worthless. The quince is becoming a leading fruit. Spraying I believe to be an advantage in fruit culture.

**RENO COUNTY.**

**President HOUK, Hutchinson:** Crops, of apples, enormous, good size and good quality; peaches, mostly seedlings, abundant; pear, heavy, some trees yielding five bushels each, which sold at \$2 per bushel. The Kieffer, a first crop, enormous; fruit fair and finely developed. They were harvested, and treated in many ways to mature for dessert purposes, but they were not good under any process. Pear trees succeed, and, aside from the Kieffer and LeConte, would pay to plant largely. Plums: The Mariana succeeds in tree and fruit. Russian apricots: Every tree was heavily loaded, but being grown from a promiscuous lot of seeds, some of them bore small, poor fruit, others medium and sugary, and others large and fine fruit. Grapes, good crop. It was materially injured by black rot and mildew on the leaves. Small fruits, fairly good. Raspberries and blackberries were injured by drought.

**SUMNER COUNTY.**

**GEO. W. BAILEY, Wellington:** Crops — apples, fair; peaches and pears, heavy; plums, especially the Mariana, immense crop. Grapes and small fruit were generally heavy.

**NEOSHO COUNTY.**

**L. WAYMAN, Chanute:** Crops of all classes, heavy. Early peaches suffered from rotting.



## CLOUD COUNTY.

VAN E. BUTLER, Delphos: Crops of all classes, good to heavy, excepting plums, which vary much in different localities. Black rot injured grapes to some extent. Blight was mostly developed in orchards on low lands.

## REMARKS.

GEO. W. BAILEY, Wellington: Pear trees—I have always cut in the growth in summer, and believe I have kept off the blight by such treatment. I would treat apple trees in same manner if this disease appeared.

On motion, the session adjourned to 7 o'clock p. m.

## EVENING SESSION.

TUESDAY, December 8, 1891.

President Houk called the meeting to order promptly on time, and announced the presence of Hon. M. Mohler, secretary of the State Board of Agriculture, whom he invited to address the Society. In response, Mr. Mohler gave in brief his early experience in attempting to establish a fruit farm in Osborne county, which, under adversity of climate and other things, was not successful. But by persistent and heroic efforts he had attained to success, and was now the proprietor of a fine orchard, which had yielded him a profitably large crop the present year. The lessons derived from his early experiences he regarded valuable, and among them one which the orchardist in western Kansas must heed, viz., that the shading afforded a tree by a full, low head is essential to success. At the close of the address, the President introduced the honorable mayor of the city of Beloit, who welcomed the Society in the following words:

## ADDRESS OF WELCOME.

BY S. H. DODGE, MAYOR OF BELOIT, KAS.

GENTLEMEN OF THE STATE HORTICULTURAL SOCIETY: It is with mingled feelings of pleasure and regret that I attempt to fill the duty assigned me to-night; pleasure, that it falls to my lot, as mayor of this city, to address you, and regret, that I cannot better perform the duty. But, notwithstanding this deficiency, I heartily welcome you in the name of our citizens to the hospitalities of the queen city of the Solomon valley. Many of you, doubtless, have never heretofore traveled this far west over the broad and fertile plains of Kansas. To such we hope a view of our thrifty towns and well-improved farms will prove a revelation of the resources of our state, and give us a kinder remembrance when we are assailed by the people who periodically "go back to wife's folks" and slander a country which always repays the energetic and economical husbandman who believes in and practices diversified industry.

The present and future of this portion of the state as a fruit-growing country, I believe, elaborated by one who knows of what he affirms, and who has done more, probably, than any other one man, by precept and practice, to prove that Mitchell and surrounding counties are as well adapted to horticulture as are the eastern counties of the state. I refer to Mr. E. A. Taylor, the pioneer nurseryman and "fruit crank" of the northwest. His intelligent labors and investigations have been crowned with complete success, and to him the people of western Kansas owe a debt of gratitude difficult to repay.

We hope, gentlemen, that you will leave Beloit, after your duties here are performed, with a kindly remembrance and just appreciation of our city, of which we

think we are justly proud. Proud of its seven churches with their spires pointing heavenward; proud of a public school system unsurpassed in the state, from which our children step at once into the State University, that grand institution, founded by the New Englanders, at Lawrence; proud of our business interests, headed by a roller mill, driven by the water of the Solomon, which never ceases work from Sunday at midnight to the same hour the following Saturday, and whose products find a market not only in the surrounding towns, but in other states; proud of three immense elevators, which handle a large proportion of the grain raised in this and surrounding counties; proud of a perfect system of waterworks, with its six miles of mains, and an electric-light plant equal to the best, all built and owned by our own citizens; proud of mercantile houses which would be a credit to cities of twice our size; of our residences, which show the prosperity and substantial character of their owners; and of streets and sidewalks which are the envy of those who have not our facilities for their improvement.

Besides all these, we take an especial interest in one of the noblest charitable institutions of the state, which was conceded to be a necessity but was never undertaken until the public-spirited citizens of Beloit put their shoulders to the wheel and demonstrated, by a practical trial of nearly two years, what could be done in this direction. I refer to the State Industrial School for Girls. Before you leave us, we should be pleased to have you all visit the school, and we can assure you that the ladies in charge will make you welcome.

Again, gentlemen, allow me to assure you that we highly appreciate a visit from the members of an association of the character of yours, composed of the most intelligent and representative men of the state, and hope you may be much benefited by your deliberations here, as we know those of us who attend your session will be.

#### ADDRESS OF WELCOME.

BY E. A. TAYLOR, OF BELOIT, IN BEHALF OF THE COUNTY HORTICULTURAL SOCIETY.

MR. PRESIDENT AND MEMBERS OF THE STATE HORTICULTURAL SOCIETY: I expected, as a matter of course, that the committee would secure some person to give you a formal address of welcome on behalf of the horticulturists of northwest Kansas in a manner befitting the occasion, but to my surprise I was selected at a late hour for this purpose.

I want to tell you, friends, how glad we pioneers of the northwest are to have you come out here and visit us and give counsel and encouragement. We want you to feel at home and enjoy your brief stay with us while performing your missionary work. We invited you here that you might see what we have done and how we have done it. We have brought these specimens of fruit to prove to you that our soil and climate will repay intelligent and steadfast industry.

We knew whom we were inviting when we asked you to visit us. We knew of your refined tastes and of your pleasant home surroundings. We commenced on the buffalo sod, as you began before us in the east. We have encountered many hardships and disappointments during these years of labor and anticipation. We have borne the cross, and now ask you to rejoice with us while we are being crowned. Our dwellings, which were built upon the unprotected prairie, are now embowered with choicest vines, surrounded with shaded lawns; our orchards contain all the fruits adapted to our climate.

In this (Mitchell) county we have grown this season about 26,000 bushels of apples, 15,000 bushels of peaches, 1,000 bushels of pears, 1,000 bushels of plums, 2,000 bushels of cherries, 500 bushels of apricots, and 60 tons of grapes, besides a corre-

sponding amount of small fruits; and this is practically the product from orchards of 6 to 12 years' planting.

We have shipped considerable of our surplus to Montana, and successfully competing with Utah, Washington and Oregon fruits. Yes, gentlemen, we are thankful, we are happy, we are grateful, and ask you to rejoice with us.

Yes, brothers, we are being crowned, and want to manifest our gratitude. We want you to rejoice with us, and to witness that we are carrying the flag inland and have planted it where it was never seen before.

In conclusion, we welcome you because of your labors to develop and promote one of the most important industries of our commonwealth; an industry that not only increases the wealth and prosperity of its people, but conduces to a higher civilization, a better manhood, and contented and happy homes. The evidences of your noble accomplishments you have given us in the great gold medal awarded your Society by the Pennsylvania Horticultural Society, in 1869, "for a display of fruits unsurpassed in beauty and excellence," and various other medals and diplomas awarded you subsequently for exhibits in eastern states. Through great labor, you have won for our state the great honor of being recognized as one of the leading states in the list of the remarkable. You have adapted her to fruit growing and pushed her well up to the front. For your many achievements in your noble line of work we earnestly congratulate you, and heartily welcome you to our city and our homes, and in the name of Beloit I bid you to fully accept our offerings on this occasion as an earnest manifestation of our hearty appreciation of your labors.

Response was made by Hon. F. Wellhouse, in behalf of the Society, in an appropriate manner.

After the rendition of several entertainments of music, the President addressed the society, as follows:

#### ANNUAL ADDRESS.

BY PRESIDENT L. HOUK, OF HUTCHINSON.

LADIES AND GENTLEMEN: In entering upon the performance of the duty which devolves upon me this evening, I feel like saying that the occasion is one which calls for an interchange of congratulations. We are assembled at the twenty-fifth annual meeting—the quarter centennial of the organization of the Kansas State Horticultural Society.

The year 1867 witnessed its first meeting. Not very many persons were assembled to lend importance to the occasion. The state had been admitted into the union five years previously, but the great civil war had intervened, and arrested the progress of our young commonwealth, so that practically the birth of the state but little antedated that of the Society. Horticulture, like almost everything else, was an experiment. Large numbers migrating from the East, and observing the unfavorable climatic conditions which were to be contended against, were decidedly of the opinion that these storm-swept prairies were and must always remain extremely unfavorable to the growth of trees, whether for fruit, ornament, or shelter. But fortunately this was not the view of all. A number of earnest and sagacious men, who had almost unlimited faith in Kansas, met at the time indicated, in the city of Lawrence, and, though no learned papers upon botany, entomology, meteorology or the other sciences which bear so intimate a relation to the art of the gardener and the fruit grower were produced or read, and though no discussions were had which developed the practical experience and observation of those who had been engaged in these pursuits in these untried regions, yet the friends and promoters of the Society builded better than even they possibly suspected or believed.

The following year the Society met again, according to appointment, at Leavenworth, and, even after a year's experience, it is said that the only paper read was an essay upon "Pruning." It is probable that few of the members had a tree to prune, but it was necessary to do something, and as it was necessary to anticipate a little, these earnest advocates of pomology felt warranted in grappling with any question which might be likely to arise in the future.

Only a year previously, that is, in the year of the organization of our Society, the American Pomological Society held its eleventh annual meeting in the city of St. Louis. In that meeting, about the only notice taken of our state, as a field for fruit growing, was a report to the effect that the only fruit which had been successfully grown here, up to that date, was the Red-cheeked Melocoton peach. Nevertheless, at the meeting of our Society two years later it was resolved that an exhibition of Kansas fruits be made at the meeting of the Pennsylvania State Horticultural Society, in Philadelphia, and C. B. Lines, S. T. Kelsey, W. M. Howsley and Geo. T. Anthony were appointed a committee to prepare the collection and superintend its exhibition. They promptly entered upon the discharge of the duties assigned them, and although the collection made was small, the weight to be transported being scarcely in excess of 1,000 pounds, the way in which the committee performed its duty and the surpassing excellence of the fruit which they had gathered are sufficiently attested by the fact that they brought back with them, in triumph, the gold medal of the Pennsylvania society. This victory was a long step toward ultimate success. It furnished "confirmation strong as proofs of holy writ" of what was claimed by the Society's friends, and it went far to silence the croakers who said that Kansas could not grow fruit.

Since these early struggles, more than two decades have passed, and, in this long period in the growth of a state like ours, the Kansas State Horticultural Society has made a history which, if we should be too modest to characterize it in suitable terms, has been fully read and understood elsewhere.

The time allotted me will not suffice to follow the successive steps by which horticulture has advanced from the very smallest beginnings to a magnitude and importance which can hardly be estimated, but it will suffice to say at this time that to-day, in the most important branch of fruit growing—I mean the production of apples—Kansas has the largest orchards in the world, has shown the largest yield of a single orchard in the world, and bids fair, within a few years, to afford the largest product of that fruit grown upon any equal extent of territory on the earth. In most of the other fruits adapted to this zone, our success has been but little inferior. That most luscious of fruits—the pear—grows well, bears well, has thus far shown itself to be less liable to the fatal fire blight than in most of the states farther east, and is certainly better in quality with us than on the Pacific coast, where its growth is so much a specialty. The peach, the queen of the fruit kingdom, is nowhere of better quality than here, and while not a sure crop, on account of late frosts, it is certainly saying a great deal when it is mentioned that we have had as much as three good crops in succession. As to the grape, which is perhaps next in value to the apple of all our fruits, I do not hesitate to announce myself a firm believer that, for the growth of the hardy native American varieties, we may safely defy competition by any of the other states.

It is not contended that our Society has of itself accomplished all of these results. Horticultural societies do not make all the horticulturists, but they do largely give direction to their efforts and help to render their labors effective. Having occasion not long since to appear before a legislative committee, for the purpose of urging the small appropriation which is biennially made for the publication of the Society's transactions and its other necessary expenses as a Society, I had the honor

to act in coöperation with the great apple king of this state and of the country, when one of the committee recognizing him, and desiring to know how far the Society had contributed to the splendid results which had been obtained in apple growing, asked to be informed on that subject. Judge Wellhouse promptly replied that his efforts largely, if not wholly, had resulted from and been inspired by his connection with the State Horticultural Society. Unfortunately it does not follow, from all of the labors so successfully performed by our Society for the advancement of one of the greatest industries of this state, that its early struggle for existence has not been prolonged into the present time. On the contrary, it is a melancholy fact that the fight for life is still going on, and at each recurring session of the legislature the same old contest must be renewed as to whether the appropriation of the small pittance shall be made, without which our labors must necessarily terminate. It will be borne in mind that nothing is asked from the state treasury but a fair compensation for the work of a Secretary whose zeal, ability and experience are beyond praise, and whose reputation as a pomologist is national, with his absolutely necessary expenses, and in addition to this the publication of the report of the Society's transactions.

But this is not the worst. The friends of the State Board of Agriculture, with the support and countenance of certain shortsighted persons who have failed to appreciate the magnitude and importance of the fruit-growing interests of the state, have not only by their opposition made it more difficult to obtain the necessary appropriation, but, as a ground for such opposition, have insisted that the legislature should make its appropriation for horticultural purposes to the Board of Agriculture, thereby working the discontinuance of the State Horticultural Society, and making the great interests of which it has hitherto had charge a secondary part of the duties of the Board of Agriculture. Such a course would doubtless increase the patronage and power of that office, but it could be nothing less than disastrous to industries which have already attained mighty proportions, but which, compared with what they may soon become under a proper fostering care, are yet in their infancy.

I have not time in which to enter into a discussion of the merits of this question, but it is enough to say that the proposed change cannot be a salutary one, for the simple reason that the soul of our organization consists in bringing together upon these annual occasions the two classes of men who are qualified to speak on the vital questions affecting horticultural interests. I mean the practical growers, who come with their ripe experience from their various fields of labor in different sections, and the men of science, who have given their days and nights to the investigation of scientific questions relating to the insect enemies and diseases relating to plant growth and life, as well as other scientific questions, and enabling all these men, who are thus so well qualified to supply information, to compare notes and give the result of their observations and experiments to the world, so that all may have the opportunity to profit by them. It is perfectly well understood that no such facilities are afforded by the other organization.

This opposition or some other malign influence, at the last session of the legislature, caused the cutting down of the number of Society reports published from 5,000 to 2,500, notwithstanding the fact that the former number was already much too small, and also a serious reduction in the Secretary's salary, when the sum formerly allowed him was so small that the services of such an officer in most of the states would have been deemed cheaply purchased at double the sum formerly paid.

The legitimate deduction from all this is, that we must educate public sentiment—that public sentiment which controls legislation—to the point that justice shall be done. This really means nothing more than saying that it is high time that we

make ourselves fully understood. The great body of the people are with us when they do understand. The most practical suggestion which it seems to me can be made in pursuance of this idea is, that the friends of the Society in every county, and there are enough in every county to make themselves strongly felt, take a sufficient interest in politics to make the wants and wishes of our people fully known to the would-be legislators, and have them understand that friendliness to our interest is a *sine qua non*, and that without this friendliness they can have no support from the great body of fruit growers and florists.

And while we are about this matter of legislative reform, there are other things hich ought not to be neglected. There ought to be a state entomologist and a state botanist—especially the former. The appropriation necessary to secure the services of a scientific entomologist would be infinitesimally small compared with the advantages likely to be derived from the labors of such an officer. Experience teaches that the saving in the fruit product of the state secured thereby would be incalculably great. I do not seek to disparage the value of the work done by the very able men connected with our state institutions of learning and the experiment stations. They have earned the lasting gratitude of every friend of the state; but they cannot do everything. We have no officer who is able to give his undivided time to such investigations as are calculated to protect our fields from insect ravages.

And there is still another matter. We ought to have such recognition by the state as would enable our able Secretary to keep an office at the capitol, just as the secretary of the State Board of Agriculture does, where he can give the benefit of his large experience to all inquirers who may seek to consult him, and where such exhibits can be made from time to time as will keep our people apprised of the progress which horticulture is making and of the improved methods by which success is to be obtained in its various departments.

It is not contended that our horticultural interests are actually comparable in pecuniary importance to the general agriculture of the state. In the production of wheat and corn and the other products of general farming, we occupy so important a position and stand so near the head when compared with the older states that there should be no disposition to depreciate these great and overshadowing interests. But while not of so much importance, horticultural interests are not the more to be neglected on that account.

As one remedy, and perhaps the most potent for good in the direction mentioned, I recommend the establishment of a state horticultural journal, which shall serve the purpose of a medium of communication between pomologists, florists, and all others having an interest in the orchard and the garden, and give to the public such valuable *ad interim* reports of our Society as ought not to be kept back until the regular publication of the biennial transactions. Such a publication would be a powerful auxiliary in the work of the Society in many ways. It would hasten the day which must inevitably come when Kansas shall lead the world in fruit growing. It will help to teach the people that happy combination of nature and art which will make Kansas homes the loveliest on earth. There can be little doubt that such an enterprise would be supported. From the "grave and reverend seigniors" who for years have labored and taught in our ranks, to the young enthusiasts who have recently united with us, all would be co-workers for its success.

The Kansas Society has already supplied a chief for the horticultural bureau of the agricultural department at Washington, a secretary for the American Pomological Society, and a commissioner for the state to manage our horticultural exhibit at Chicago, and it can supply a corps of editors for a horticultural journal unsur-

passed in ability and fitness. Learned professors and practical toilers would vie with each other in enriching its columns with their contributions.

Two years ago, at Paola, I felt constrained to advert to the fact that a period of depression had fallen upon us, not greater, to be sure, in degree than was felt in the other pursuits of life, but it was referred to nevertheless as a fact that for several years previously the destruction worked by insect enemies had conspired with the effects produced by the severe vicissitudes of the seasons to deprive tillers of the soil of the just fruition of their labors, and that this evil was aggravated by the prevalent low prices paid for the slender product which had been saved. But since then what a change has been wrought. How has the "winter of our discontent been made glorious summer!" To-day we may look around us and bid the lovely prospect hail. Hope with her beautiful hand points to the future, and bids us look for still brighter and greater things yet to come.

The current year and its immediate predecessor, but especially the former, have been years of unexampled abundance. The fabled cornucopia has indeed been inverted, and its rich stores have filled the smiling land. Everywhere orchards bending to the earth have seemed to mutely appeal for aid in supporting the crimson and golden burdens which they have borne. It has been estimated by the agricultural department, that the products of the soil this year have exceeded in market value those of any previous year by 700 millions of dollars. Of this increase in value Kansas has earned her full share, and of this share the increment in horticultural products has fully kept pace with the cereals.

But in casting our eyes over the outlook, many other things are apparent from which the votaries of horticulture may derive well-founded encouragement. In all of its departments a strong impetus toward the acquisition of greater knowledge and the application of better methods is visible.

Vegetable pathology, thanks to our societies and experimental stations and to the department of agriculture, has become a recognized part of the field for scientific investigation. Plants are now well understood to have their diseased conditions, dependent upon disturbances of the laws of their organization, just as animal organisms, and, under the new order of things, vineyards and orchards are converted into clinics, where, after prolonged and patient examination by experts, diagnoses are made, and the resources of a *materia medica* adopted to plant life are sought to be intelligently applied, with the view of restoring healthy conditions.

Insect pests are likewise receiving a greater degree of attention than ever before, and with a correspondingly favorable result. Insecticides, such as the preparations of arsenic, and others, when applied by spraying, have been found so effectual as to save from destruction enormous quantities of fruit which would otherwise have been lost.

Specifics have also been discovered, or are about to be discovered, by the application of which leaf blight can be prevented, and also for the deadly black rot and mildew of the grape. By these last-named maladies, some of our best varieties of grapes have been driven from cultivation, and whole vineyards have been practically swept out of existence. It is not possible to estimate the benefits of agencies which, at a comparatively trifling cost, may be relied on to either wholly prevent or render these diseases harmless.

The increased mental activity and energy of the horticulturist is reaching out in still other directions. By producing new seedlings, grown under the influence of our immediate environment, by hybridizing, and by importations from the old world, especially from China and Japan, new varieties are introduced, many of which will doubtless prove acquisitions of the very highest value. Many sorts now un-

profitably grown are likely to be supplanted by others of better quality and greater value.

It may be asked, Where is all this to end? May not the result be such an over-production as will prove ruinous to fruit-growing industries? My answer is in the negative. Fruit is the most perfect combination of beauty and utility known to man. Its use is equally a luxury and a necessity. From infancy to old age, people must and will have it, and the demands of the consumer will fully keep pace with the ability of the producer. Let us therefore contemplate without misgiving the approach of the golden age of horticulture, when the "flower of commodities," in unstinted quantity and unlimited variety, shall be within the reach of all, from the least to the greatest.

The meeting then adjourned to 9 o'clock A. M. the following day.

## MORNING SESSION.

WEDNESDAY, December 9, 1891.

President Houk in the chair.

On motion, the Secretary was instructed to send a telegraphic message of greeting to the Illinois State Horticultural Society, then in session at Champaign.

*To the Illinois State Horticultural Society:*

BELOIT, December 9, 1891.

We extend you hearty greetings and best wishes, trusting you will have a profitable session.

KANSAS STATE HORTICULTURAL SOCIETY.

Then followed the reports of the Committee on Vegetable Gardening.

## VEGETABLE REPORT.

BY E. F. WALTER, OF WAKEFIELD.

The early crop of vegetables for the past year, like the fruit and wheat crop, will be long remembered as one of the most abundant in the history of even bountiful Kansas. Vegetables of all varieties have been so plentiful, from the eastern to the western boundary, and prices so low, that, though there has been but a small margin of profit for the vegetable grower, we ought to be thankful there has been such a plentiful supply of health-giving "fruits of the earth" within reach of all. Kansas is a land of extremes, and while one section of the state may be receiving a surfeit of rain, another section, but a few miles distant, may be suffering from drought. The southern half of Clay county and territory adjoining was visited by a severe dry spell from early summer until September. The drought was so severe that apples and peaches shriveled upon the trees as a consequence throughout this section.

Late potatoes and most late varieties of vegetables are a very short crop. As far as possible, early-maturing varieties should be planted in all sections subject to these hot, dry spells. Wherever the Early Ohio potato was planted a full crop has been harvested. After considerable inquiry, I can learn of no other potato in our district that has made a full crop unless they were mulched. In fact, all later varieties are either a failure or a very small yield. The Early Ohio seems peculiarly adapted to our climate. Its continual cultivation does not appear to run it out, as is the case with most other varieties. The samples upon the table were raised from seed that has not been changed for seven years, and no manure was used upon the field. During the past nine years this potato has never failed to yield us 100 bushels,



and often nearly 200 bushels, per acre. Last year, 1890, no rain fell to wet the ground two inches deep between planting the seed and the tops drying up, yet we harvested 100 bushels to the acre. They were planted on fall plowing, as potatoes always should be. We have discarded all other varieties, and shall continue to do so until we find something better.

The Early Yellow Carolina sweet potato is worthy of extended trial, on account of its maturing very early, its good quality, and its productiveness.

The dwarf Lima bean is an acquisition of great merit, easy of culture, stands drought remarkably, and fruits abundantly until sharp frosts overtake it. The beans are an excellent substitute for green peas at a time when green peas cannot be had.

In tomatoes, the novelty of the year was introduced by P. Henderson & Co. as No. 400. In point of size it is the king of tomatoes. Every specimen seemed to weigh a pound or more. We weighed one that turned the scale at 20 ounces; but with us it was not very productive, and rotted badly. The fruit will not compare with many of our best varieties, such as Beauty, either for profit or domestic purposes, and this is the case with most of the vegetable novelties introduced every year. Few of them possess superior merits to the standard varieties that have been well tested.

In onions, the Globe varieties produce best crops and most attractive bulbs, and are among the best keepers.

Eggplants should receive more general cultivation; Large Round Purple is the best variety, but eternal vigilance is necessary to secure a crop of this fruit. The Cabbage Flea Beetle and Potato Bug are its worst enemies. London purple must be used with great care, as the foliage is so sensitive. The best way is to pick the bugs by hand every morning.

Asparagus, one of the most wholesome and delicious of the whole list of vegetables, should be found in every village lot. It is very easy of cultivation; a small bed with little care will last a lifetime, and give two months' supply of the delicious esculent every spring.

For early cabbage, the new large Wakefield and Henderson's Early Summer have taken the place of the old Jersey Wakefield, and for winter use, Surehead or Succession are the most certain to succeed. We have found no cauliflower to supersede Henderson's Snowball. If set out early in spring, it is as sure to head as a cabbage; but the land cannot be much too rich for cauliflower. The greatest enemy to the cabbage crop is the green Cabbage Worm, but it can be easily destroyed, without injuring the crop, by the use of buhach, either in solution, using one ounce to two gallons of water, and applied either with force pump or common sprinkler, or, the powder may be used with a powder gun or bellows, mixing it with from four to eight times its bulk of flour, whichever form is most convenient. It should be applied every two or three weeks. There is much ignorance upon this subject, even amongst men who should know better. A neighbor came to me last September to ask advice about destroying the worms upon a considerable patch of cabbage. He said he had been to one of the leading drug stores in Junction City to procure *something to kill* the Cabbage Worm. The druggist advised him to use London purple, 1 pound to 40 gallons of water, telling him to "sprinkle it over them, and it would instantly kill the worms." He told me he had used one pound upon his cabbages, but it was *no good*. In disgust, he caught some of the worms and gave them a *bath* in the mixture, but it was all *no good*.

The best varieties of celery for the family garden are White Plume for early and Golden Self-blanching for late, a handsome variety and a splendid keeper. For market purposes, Giant Pascal should be added. It is a fine, strong, vigorous

grower. Regarding celery culture in central Kansas: after another year's experience with growing celery, I have lost so much enthusiasm, I am afraid to say much in advocacy of its culture for market in this climate, for, though we can grow by irrigation very fine celery, it is always through great tribulation. This fall we had the promise of a fine crop, carried successfully through the dry, hot weather and a severe attack of rust or celery blight; but about the middle of October the Tarnished Plant Bug concentrated upon it in such destructive numbers that they had seriously damaged the crop before we were really aware of it. As soon as possible we sprayed a portion of the crop with kerosene emulsion, using 5 gallons of oil to 16 gallons of water. We found the Vermorel nozzle distributed the liquid more evenly and with less waste than the Boss, or Graduating nozzle. This application destroyed most of the bugs where it was used, and having in mind past disastrous experience, we washed the foliage an hour after with several barrels of water, using great force, with the Boss nozzle. Upon taking up the celery a month later, not a stalk was found to be injured by the application, nor could we detect, by smell or taste, a trace of the oil. I would have shown you some of this celery, but the unusually severe frosts that visited us so early caught us somewhat unprepared and froze it severely. The remainder of the crop that was not sprayed was rendered worthless by the pest. In irrigating celery, water should never be sprayed or sprinkled upon the foliage, as it has a tendency to blight or rust the crop. This blight being a fungus, Bordeaux is being recommended to spray with. If we muster courage to grow celery again, we shall try spraying against this disease. The bugs also attacked, in great quantities, a patch of about 2,000 cabbage and cauliflower adjoining the celery; but being afraid to apply such strong emulsion to cabbage and cauliflower so nearly matured, the bugs were left in undisputed possession. Result, they quite destroyed the crop.

An insecticide sent out by a firm at Brooklyn, N. Y., and strongly recommended as being very effectual against this pest, put up in various sized cans, and called "Anti-pest," was found, upon examination, to be kerosene emulsion.

The following statement by F. M. Webster, entomologist Ohio Agricultural Experiment Station, may be of value to some of you who may be growing celery:

The insects sent as injuring celery are the Tarnished Plant Bug, *Lygus pratensis* Beauv., and belong to the same order of insects as the Squash Bug and the Chinch Bug. The species is very widely distributed, abundant, and one of the most troublesome pests of the garden and orchard. As long ago as 1838 they were observed to injure dahlias, marigolds, asters and balsams in the flower garden, and in the vegetable garden they worked havoc on young potatoes. Since that date they have been known to destroy the buds of apple, quince, pear, cherry and plum trees. Several years ago they appeared in the strawberry fields of Mr. Parker Earle, in southern Illinois, and destroyed thousands of dollars' worth of fruit by puncturing the young berries. This year they are attacking celery in several localities, especially in Indiana. There are two broods each year, one maturing in May and June, the other in July and August, the latter passing the winter about rubbish, among the leaves of mullen, and in fact anywhere they can find protection from the weather. Effective remedies are difficult to apply, and I know of nothing better than kerosene emulsion. This is made by dissolving one-quarter pound of hard soap in one-half gallon of hot water, and, while still hot, pour the mixture into one gallon of kerosene, and churn or otherwise agitate violently until a thick, creamy substance is formed, which is mixed with 8 or 10 parts water, and applied with force pump or garden syringe.

## VEGETABLE GARDENING.

BY H. A. EARNHART, OF KELLOGG.

It is natural for every one to wish for a good garden. How the "gude housewife" prizes a bountiful supply of choice vegetables; and when her liege lord fails to provide them, how often she strives to grow them unaided. She knows they mean health to her family and a pleasant change from her many arduous household duties.

Southern Kansas will always be a desirable location for the expert gardener. It

is only such that will succeed in growing good crops of all kinds of vegetables, for the reason that he knows that unless he gives untiring attention to the selection and growing of his crops he is almost sure to fail. The methods practiced in other sections will not answer here. You must study, think, and experiment, and evolve new plans and ways of doing your garden work. I venture to say you can grow almost everything here if you will only find the proper way.

*Manure.*—Here in the Arkansas valley I have never used anything but green manures in the seven years that I have been engaged in gardening, and all who know my gardens will certify that I am pretty successful in growing an abundance of choice vegetables. My plan is to sow about three pecks of rye to the acre, in the latter part of August or early in September. This can be done on all plats where the earlier vegetable have been gathered. You can graze it all winter, and in the spring when it comes into blossom, turn it under. In 10 days it will be decayed, you can then harrow it and put in your plants or seeds. It will be one of the mel-lowest and most fertile seed beds you ever saw. Its effect on the crops and ground can be noticed for several years after.

I did not garden long in this section until I learned that one important secret was to be observed in all my operations, if I wished to be successful—that is, deep plowing and constant stirring of the surface, particularly in a dry season. A loose surface soil acts the same as a mulch in stopping all evaporation and keeping up a healthy plant growth. This soil is naturally drought resisting, and by practicing the above system I am able to circumvent any ordinary dry season and grow plenty of good vegetables. This plan applies as well to farm crops.

Some people say this is not a tomato country, but I say you can grow a fair crop of tomatoes nearly every year, if you will set your plants in deep furrows, and, as they grow up, keep working the soil into them; and finally, before they lay over, ridge them up by drawing plenty of loose earth to them. The dry weather will not affect them much. Many persons believe that the tall-growing varieties of peas cannot be grown successfully in this section. Nearly all plant the dwarfs. Plant the tall kinds in this way, if you want a large crop: Draw a very deep furrow, and scatter your seed thickly in the furrow, (it is very necessary that the seed be sown thickly, as the plants support each other, and you do not need to give them any other,) cover lightly, and, as the vines grow, work the dirt into the furrow until full. Continue cultivating as long as you can. By planting deeply, the drought will not affect them so soon as if planted shallow.

Celery is an uncertain crop without irrigation. It can be grown every season if planted in spent hotbeds or highly-manured beds, six feet wide and as long as you like. The beds should be boarded up on the sides. Set the plants in rows, four or five inches apart, and if they grow above the frame put on another tier of boards. For early blanching, put boards between each row, but for late dig a trench one foot wide and as deep as the celery is tall; then pack the stalks in the trench as tight as you can get them. Cover the trench with boards, and add litter or straw with earth on top as the cold weather advances, to keep it from freezing. In this way it will blanch nicely and keep until spring.

Many failures in growing vegetables in this section are due to the fact that nearly all who try to have a garden are too saving with their seeds. It has been my experience that it is best to sow all seeds thickly in drills to overcome all contingencies and get a good stand of plants. When the plants have made some growth, they can be thinned out.

The farmers of Kansas give too little attention to flowers, fruits, and vegetables. Let all resolve that they will beautify their places with trees and flowers, and give

careful attention to fruits and vegetables, and they will bring to their homes some of that Eden that Providence intended all should enjoy.

Mayor Dodge then invited the attendance to visit the Industrial Reform School, which, on motion, was accepted, and time fixed at 1 o'clock P. M.

Next in order was the following report on condition of

### ORCHARDS.

BY E. K. WOLVERTON, OF BARNES.

I will only attempt to report for the northern fruit district, in which I reside. So far as I am able to learn, the horticultural industry is in excellent condition. Trees and plants have passed the season under favorable conditions for growth and maturity.

Crops have been abundant and of fine quality, and found a ready market. In some localities a temporary drought caused a shrinkage, but the fall rains measurably repaired the damage to late-ripening fruit, and brought the trees up to a good condition.

### SMALL FRUITS.

BY B. F. SMITH, OF LAWRENCE.

In times past, before it was known that small fruit could be grown in Kansas, it was expected that committees would impart some information about soil, preparation, planting, winter protection, etc. But as the growers of our state have generally gone beyond the point where such information is desired, my paper will be confined to report on crop of 1891, varieties, markets, future outlook, etc. This was the most unfavorable season for picking and shipping berries ever known in eastern Kansas. The markets throughout the West were glutted continuously with soft, half-rotten Crescents. After our first week's picking we let them alone, and saved what we could of the firmer varieties.

Express rates on berries are about the same that existed years ago, when this fruit sold in our home and in distant markets for from \$3 to \$5 per crate. Would it not be policy for express carriers to give lower rates to distant markets, and thus give the fruit grower a chance to live and grow products that are profitable for them to handle, or will they continue the old rate and cut off the small-fruit trade? This matter is worthy of some consideration by express carriers.

### A FEW POINTS ON STRAWBERRIES.

The Michel is the earliest variety, and, while it does not quite suit our ideal for commercial purposes, it gives a longer strawberry season by at least a week.

The Pearl is a valuable berry. It has fruited two years on our grounds. Its fruit is as large as the Downing. The plant is a strong grower, and its berries are as firm and of better color than the Warfield.

The Warfield is one of our best commercial berries, and it will grow to large size when not allowed to set its runners too closely.

All that has ever been said about the Haverland and its productiveness is true, but its berries are soft, and not profitable to grow largely for commercial purposes, except for near-by markets.

Windsor Chief and Glendale, in my estimation, stand next to Captain Jack for general commercial purposes. They are strong, hardy growers, and seem to thrive all over the country.

The Bubach, as shown by all the reports in the West, is the largest strawberry ever produced. Its season is short, lasting only about 10 days. To bring it up fully to what it may be made to attain in size, it should have good loose soil, with

some well-rotted manure to lie by the plants all winter. While it is not firm enough for long transit, it serves well to create wonder and astonishment.

The Jessie and Edgar Queen are very near the Bubach in size on our grounds. Should we grow them on sandy soil, in all probability they would attain the size of Bubach.

The best shipper is the famous old Captain Jack. Its season begins a week later than the Crescent or May King, and 10 days later than the Michel. When its plants are not allowed to set too thickly, its fruit will average larger than the Crescent or Michel. It stands well in the estimation of all berry growers who have to depend on distant markets.

The Mount Vernon is the latest of all the hundred varieties on our grounds. From the Mount Vernon bed we get the best dish of strawberries. It is not a handsome berry, but its flavor is nearly equal to the best, and in firmness it is the equal of the Crescent. Its product varies according to the wetness or dryness of the season. It will not stand as much dry weather as the Captain Jack, but when the season is favorable it is almost equal to that famous old variety.

The Robinson is a valuable new berry that has never had a professional advertiser to boom it. But some professional on new strawberries may, in the future, get an engraving of it and give it the send off it deserves. One good point about the Robinson is its strong, healthy plant and strong, staminate blossoms. It is as good a pollinizer as the Captain Jack or old Wilson. The best point in this sort is its large, beautiful berries. Its ripening season comes 10 days later than the Crescent, and continues several days after that old sort is out of the way. An old berry picker was asked at the close of the season where he made money fastest picking berries. He quickly replied, "On the Robinson beds." All he desired was, that the other pickers be kept off the Robinsons.

#### RASPBERRIES.

The Souhegan is failing to give the satisfaction it did in its earlier days in Kansas. We need a new early black raspberry, a native of this country. If one is introduced, it will doubtless meet with favor.

The Nemaha and Gregg were our best black caps this season, and sold for better prices than Souhegan.

The Red Varieties.—These raspberries were not so abundant this season as usual. The needed pollenization was doubtless disturbed by the frequent showers of hard rain during the blooming season. The firmest reds with us are the Thwack and Cuthbert. These sorts stand up better in transit than the Souhegan (black), and they sell for better prices at home and abroad.

#### BLACKBERRIES.

There has been a remarkably large product of blackberries all over Kansas the present year. Our choice for commercial purposes and home consumption is the Snyder and Taylor. The latter is nearly as large as the Kittatinny, when properly cultivated, and its canes are kept or grown in hills, three to four feet apart.

The Early Harvest, though small, sells well until the larger sorts come on the market, when its crop is about half gone.

The old Kittatinny rusted this season as usual so badly that its crop was not a fourth part as large as the Snyder.

Stone's Hardy is the very latest sort of blackberry and about the size of Snyder, and in regard to product it is about the equal of that sort. Its only advantage over any other sort is in its lateness in ripening.

The Western Triumph is a fine, large berry, of fine taste, but in productiveness is not the equal of Snyder or Taylor.

The Erie has many friends, but we prefer the Taylor.

#### FUTURE PROSPECTS OF BERRY CULTURE.

What of the future of berry culture? many of my neighbors ask. Is there any prospect of better prices in the years to come? We invariably answer, Not until there is less acreage of Crescent strawberries. It will take a few years for berry growers to learn this fact. They will continue to cultivate it a while, expecting a change in markets, but in which they will meet with disappointment. Many fruit growers make a specialty of one sort of fruit, and, when only one sort is grown by a great many large growers, is it any wonder that our markets are so frequently glutted with large products of the country? With less acreage, it takes less labor to cultivate and grow the crop, less expense for fruit packers, less work in hauling to market, less wear and tear of machinery, brain, and body. Then less acreage is an assurance of better prices. The greater prices over cost to produce a small crop will more than balance the small margins (or no margin) above the cost to cultivate and put a large crop on the market. These matters are worth careful consideration by all berry growers, whether they continue to grow large fields of unsalable varieties or grow less acreage of the better sorts of fruit at a profit.

#### SMALL FRUITS.

BY MISS ANNA BOWMAN, OF LEAVENWORTH.

Strawberries came through the winter in fine condition, and indications pointed to an enormous crop. For some time previous and during the blossoming period very little rain fell; the ground was dry and hard, and much apprehension was felt.

When the Crescent was within about a week of ripening its first berries, we had rain, and during the rest of the season it fell it quantities at any and all times, and it was pick in the rain or not at all. As a consequence, the market was glutted with soft fruit, very little being in any condition for shipment. Thousands of bushels rotted in the fields, and whole plantations of Crescents were never picked. The fruit sold as low as 50 cents a crate, and few buyers. The average price was \$1 per 24-quart crate. Where the plants were well mulched, the berries were much better. But wherever a berry, either in the green or ripe stage, came in contact with the ground, it immediately rotted.

The Warfield came into market here this season for the first time, and the result proves it has come to stay. It stood the wet weather better than any other berry, and always brought the highest prices. Warfields sold for \$3 per crate, when other berries were going begging at \$1. I sold Warfields at \$1.75, when inferior sorts were only bringing 50 and 75 cents per crate.

The Bubach is a grand variety, in spite of its failure to stand a wet season; it rots badly. Given a favorable season, there is none better for the money, especially for home market. Its great size and bright color find it a ready sale, if care in picking is exercised. It is a valuable berry for shipment.

The Crescent, so far, is our best early berry. Michel has not yet been fruited here. Spring-set plantations of this variety show a wonderfully vigorous plant growth.

The Haverland is much praised by those who have fruited it, and it will be planted extensively next season.

Jessie is valuable only as a fertilizer for the Warfield, and when we get something better in its fruit it will not be heard from. One of our local growers has originated a new variety, called the Cyclone, which he predicts will supersede the Jessie as a

fertilizer for the Warfield. We hope it will, as the Jessie has proved worthless to us, except as a fertilizer.

Captain Jack is not keeping up its record with us. The blossoms blighted badly this season, and the yield was very inferior.

Windsor Chief yields a fine crop of handsome berries; large, firm, and with a glossy, beautiful color that always attracts attention, if picked before maturity; quite acid in flavor; is an excellent shipping berry; gives the best results where not allowed to mat too thickly; and is fertilized with Glendale.

Glendale is valuable only as a fertilizer for the Windsor Chief and Bubach. It makes a splendid fertilizer for Bubach, seeming to impart some of its own firmness. I find hard work to dispose of the Glendale, but will continue using it as a fertilizer until I can get something better.

The Mt. Vernon is a good late variety; productive; fine flavor; moderately firm, and lengthens out the strawberry season. I sold the last picking of this berry the 27th of June, realizing \$2 per crate. Our early berries came into market about the 16th of May.

The Gandy has disappointed me very much. It yields a few large, handsome berries, but not enough to pay for planting. It may prove valuable in some localities, or where size not quantity is desired.

The Cloud is valueless in this section, as are Chas. Downing, Downer's (Prolific), Pineapple, May King, Sharpless, and Lady Rusk, but Stayman's No. 1 is well spoken of. I will fruit it next season.

If I could only plant two varieties, I would say Warfield and Bubach. Plant the Warfield three feet apart in the rows; keep them well thinned, and fertilized with the Jessie. Bubach is not such a rank grower as the Warfield. It seems to thrive on poor soil when fertilized with Glendale or Jessie.

This season was an unfavorable one for the strawberry grower. Everybody seemed to have developed a taste for horticulture. Every farm wagon, buggy, cart or vehicle of any description coming into town held concealed in its recesses one or more crates of strawberries. They were peddled from house to house, and traded at the store, or more frequently left to be sold at what they would bring. Many acres have been plowed under since the unfavorable returns. The grower of the future will have to be satisfied with small margins.

Raspberries never sold lower than during the present season. They averaged \$1.25 per crate; \$1.40 for the Gregg. The leading varieties were Hopkins, Souhegan, McCormick, and Gregg. When we get a variety that will combine hardiness with the size and yield of the Gregg, we will have the ideal raspberry. Our Douglas county friends claim to have originated such a berry, and we are anxiously awaiting it.

There was a great demand for red raspberries this season, and doubtless many acres will be set with them next spring. People are fickle, and whenever an article becomes scarce they want it. A few years ago it did not pay to raise the reds, as there was no demand for them. Now everybody wants red raspberries. The Turner for early, and the Cuthbert for medium and late, were the chief varieties planted. Shaffer's Colossal does not meet with favor here—winterkills, and its dark color affects the sale.

Blackberries yielded well this season, and also came in for low prices. The Snyder, when severely pruned, well cultivated, and given abundance of plant food, is the berry for the fruit grower. Close pruning greatly increases the size, and its wonderful productiveness and hardiness place it in the lead. The blackberry is just coming to the front here again. The Kittatinny and the Lawton, which used to be planted extensively, proved such failures as to discourage the planting of blackberries. The

former rusted badly, and the latter always winterkilled. The merits of the Snyder are now beginning to be appreciated. The Erie bore a fine crop of berries this year, and, if it stands our climate, will be a valuable addition. Its only fault lies in the late ripening. The Taylor, with but few exceptions, has proved worthless, and does not pay for the ground it occupies. It is a delicious berry, and, for the amateur who can coddle and study its needs, I know no better. Some report favorably on the Early Harvest, claiming that, while it is not hardy, its earliness makes it a valuable berry.

I think that there is more money in raising blackberries at \$1 per crate, which was the average price paid this year, than in growing raspberries at \$1.50 per crate. I do not want any more raspberries. I have to neglect my strawberries to pick and market them, and that do not pay. There is just enough of a hiatus between the strawberry and the blackberry to give the poor grower a chance to "ketch up."

I used the "Ideal Berry Box Machine" this year, and saved its price in the economy of time and material.

"Breathes there a man with heart so rash  
To dream by small fruits to keep in cash;  
If such there be, go, mark him well:  
A few short years will sound his knell.  
For him, no more the rural scene,  
The commission man of suspicious mien;  
The populous city gathers him in,  
And he dreams no more of the fruit-grower's 'tin.'"

#### DISCUSSION OF REPORTS.

MAJOR HOLSINGER, Rosedale: Miss Bowman's report is highly creditable. But one or two points advanced need consideration. We frequently come to conclusions because we fail to succeed with varieties and treatments, while others, not remote from us, do succeed. The Taylor blackberry requires a moist soil, and under such conditions it succeeds. Its size, color and lateness in ripening are all in its favor. The Snyder is the lazy man's berry. A large number of seedlings, resembling it in character, are found in many portions of the country. The Michel strawberry is a failure on the uplands of Missouri and Kansas.

I. I. TRUX, Delphos: The Snyder blackberry is worthless for the western portion of the state. The Kittatinny is preferable.

WM. CUTLER, Junction City: The Kittatinny freezes to death in my county. The Snyder is succeeding. It will kill down during some winters, and suffer from rust, but it is our best sort.

E. K. WOLVERTON, Barnes: The Kittatinny is our best sort. The Wilson always winterkills.

ALEX. SPIERS, Washington: The Early Harvest does best in my locality.

L. WAYMAN, Chanute: The Early Harvest and Kittatinny blackberries endure the winter well. The first, when planted on a northern slope, requires protection.

PROF. E. A. POPENOE, Manhattan: I have not much faith in the Wilson blackberry. The Early Harvest is successful, when grown on clay land. Kittatinny, although it fails some years, is preferable to the Snyder.

MAJOR HOLSINGER: The Early Harvest should be grown on high lands to become most productive.

The relation of bee keeping to horticulture was ably discussed by L. Wayman, E. J. Weekly, and others, after which the session adjourned until 3 o'clock P. M.



## AFTERNOON SESSION.

WEDNESDAY, December 9, 1891.

The Society assembled at the opera house, after a pleasant and interesting visit to the Industrial Reform School, and was called to order by the President.

The first topic taken up under the program was a discussion on

## ENTOMOLOGY.

**MAJOR HOLSINGER, Rosedale:** Both the Plum Curculio and Plum Gouger are captured on the same tree. I have found the Plum Gouger working in the crab apple. The best method for their capture is that recommended for the Plum Curculio, viz.: Spreading a sheet under and jarring the trees, and, as they fall onto the sheet, gather up and destroy them.

**PROFESSOR POPENOE:** The Plum Curculio is of much larger proportions than the Gouger. If spraying will protect the fruit, why jar the trees for their capture?

**E. H. KERN, Mankato:** Spraying, where applied in my neighborhood, was successful in 1891, and the crops on same trees in 1890 were almost entirely ruined by insects. Paris green was used by some orchardists, and London purple by others.

A gentleman in the audience here stated that, in 1890, he sprayed his apricot trees immediately after the blossoms dropped. It did not protect the fruit. In 1891, he did not spray, and the fruit was not infested with worms.

**F. W. DIXON, Netawaka:** My plum crop heretofore has been very much damaged by the Plum Curculio and Gouger, although I had sprayed, while my neighbor, who did not spray, seemed to have escaped their attack.

**E. H. KERN, Mankato:** I know from experience that spraying, properly done, will protect the fruit from injury. Rains, and even heavy dews, may, to some extent, counteract the benefits which would accrue under favorable conditions.

**MR. TEMPLE, Beloit:** In 1890, I examined many apples in Mr. E. A. Taylor's orchard, and it was difficult to find a worm; and in 1891, no worms could be found in the apples on sprayed trees.

**F. W. DIXON, Netawaka:** It is quite apparent in the orchards of my locality that were sprayed; the fruit was finer, and commanded better market prices than that from unsprayed trees.

**THE PRESIDENT:** The results of my efforts in spraying have been very favorable. Of plums, I had a crop of Shropshire Damsons and Coe's Golden Drop, and one of my neighbor's trees of the Washington and Imperial Gage and many others bore full crops. Our Russian apricot trees yielded a fine crop; all of which we believe is the immediate result of spraying.

**L. R. CLARK, Simpson:** I have tried spraying, jarring the trees, and keeping broods of chickens yarded among the plum trees, and find that the jarring process affords the best results.

The discussion closed, and the President announced in order the election of a trustee for the southern district, which resulted in the reelection of Geo. W. Bailey, of Wellington.

## NOMENCLATURE AND NEW FRUITS.

REPORTED BY THE STANDING COMMITTEE.

**MR. PRESIDENT—**As one of the Committee on Nomenclature and New Fruits, I will submit the following brief notes:

During the past winter a specimen of a variety of apple was received from an orchardist near Eskridge, Wabaunsee county, for identification, the tree which

bore it having been bought of a nurseryman located a short distance north of Emporia. It was named Johnson's Fine Winter. This is the only synonym given in Downing's work for the York Imperial. I speak of this for information of the distribution of that valuable sort in the state, and that, with former reports of other localities, show it has had a more general distribution than has been known.

I have found, during the present season, that many pear trees planted for the Clapp's Favorite are the Superfin, which has a tendency to suddenly rot at the core, which is not characteristic of the Clapp's Favorite. The Superfin is a most excellent and beautiful large pear. The tree is quite hardy and fully productive. If picked before quite ripe, the rotting at the core is not likely to occur, but its quality will be poor.

The Rutter fully sustained its good character in tree and fruit. The Emile d'Heyat, ripening in November, is a new introduction, but appears to adapt itself to our climate. The Margaret, also a new introduction, bore a heavy crop of excellent pears. It is the only really good early variety I have yet found, ripening a couple of weeks before the Bartlett. The tree so far is hardy, vigorous, and escapes attacks of blight.

#### NEW SEEDLINGS OF KANSAS ORIGIN.

An apple from E. A. Taylor, Beloit; a very fine and excellent dessert variety, equaling the Celestia, which Warder pronounced "the best" of all apples.

An apple from J. Weidman, Pleasant Valley, Lincoln county; a very desirable early autumn variety.

A pear from Omar Ayer, Lawrence; a very promising dessert and market sort; season, October.

Strawberry specimens from Eureka, Greenwood county, reported to be the result of a cross between the Wilson's Albany and Sharpless. Plant, strong, vigorous, hardy, and productive; berry, large; begins to ripen a little before the middle of May, and continues until the middle of June in the locality of its origin.

During my visit through the northwest, I was greatly surprised at the confused nomenclature which I discovered among both planters and agents for Kansas and eastern nurseries in the classes of fruits being grown and propagated. Who are responsible for such confusion I will not attempt to say, but as long as uninformed men engage in such business, just so long will the industry suffer. The indifference on the importance of this subject is deserving of severe criticism.

At the close of this report, the session was adjourned to 9 o'clock A. M., the following day.

### MORNING SESSION.

THURSDAY, December 10, 1891.

The meeting was called to order by the President, at the hour adjourned to.

The Secretary offered the following communication from J. M. Samuels, chief of the department of horticulture, World's Columbian Exposition:

*Mr. G. C. Brackett, Secretary, Beloit, Kas.:*

DEAR SIR— . . . I would suggest that you urge thorough organization, immediately, for World's Fair horticultural work. As I believe you understand thoroughly the importance of promptness in the matter, and the ways and means to accomplish it, any suggestions would be superfluous.

I recommended to the World's Fair management an appropriation of \$45,000 for cash premiums, and gave the following reasons for doing so:

"Believing it will result in economy to the exposition management, besides being an act of justice to a certain class of exhibitors."

Wishing you a very profitable meeting, I remain,

Very respectfully,

J. M. SAMUELS, Chief of Department of Horticulture.

On motion, the letter was referred to the following committee: Prof. E. A. Popehoe, E. A. Taylor, and F. Holsinger, who were instructed to duly consider the matter offered, and to recommend such action by the Society as in their judgment seemed best.

### VINEYARDS.

BY GEO. F. ESPENLAUB, OF ROSEDALE.

The grape crop of the past season has been a phenomenal one, in quantity, in this part of the state. The past winter has been so mild that not a bud on any of the most tender varieties suffered the least, and the fall before was exceptionally favorable for the production of an abundance of well-developed fruit buds. The most productive kinds, such as Ives and Elvira, produced very many double and treble buds, and where such were not liberally thinned, too much fruit set to produce fine bunches. With the wettest season in the fore part that I have ever known, we were happily disappointed in experiencing very little rot, and only later on, when it became dry and cool, did mildew make its appearance on the foliage. Many complained that their Goethe and some other sorts lost their foliage from mildew before the fruit had more than half ripened, but where spraying was practiced the foliage remained green until frost. I saw a vineyard of Missouri Reisling of several acres that had lost nearly all of its foliage by mildew quite early in the season, and most of its fruit by black rot. This was on black, rich land, and rather inclined to be wet, but on dry land there was no trouble on that score.

Prices ranged considerably lower than for several years past. This can be accounted for partly by the great abundance of all other fruits, and especially by the bulk of the peach crop, which ripened about with the grapes, and detracted considerably from the demand and consumption of the grapes. Yet, notwithstanding all this, fairly remunerative prices were maintained. The season throughout having been rather cool, the crop ripened slowly and rather late.

A REPORT BY JACOB WEIDMAN, OF PLEASANT VALLEY.

This season has been unfavorable for the vineyardist in this section of the country. The vines went through the winter and came out in extra-good condition, but on May 11 a late frost (27 degrees Fahr.) killed nearly all vegetation in some localities. In some places no damage was done. The Concord suffered the most. Noah, Elvira, Niagara and Missouri Reisling started out again from dormant buds. The Noah, Martha and Amber bore mostly a full crop.

We had no disease; the insects were not troublesome. There was no black rot, in spite of wet weather, but the Noah suffered from mildew. Half of the fruit rotted.

The Neosho, Cynthiana, Louisiana and Herman bore a full crop. I have a four-year-old seedling, of the Neosho, that rivals them all. The Early Victor is a good substitute for the Champion or the Ives. The Worden is still better than the Concord, and makes finer and more marketable fruit.

To sum up, the Concord is losing ground every year. In the first place, it does not set the fruit well, and next, it ripens the fruit on the bunch unevenly. But we have to grow early grapes to get a good price before those from Lake Erie come in, or else very late ones for winter, which command a high price. Our best and most profitable vines are Elvira; next, Missouri Reisling.

I have in the neighborhood of 100 varieties fruited, or tried, though I found out that I would have done better with one dozen. After all, I don't take much stock in these new, high-priced varieties. Most of them are humbugs.

The grape business is gaining ground every year, and most every farm has a little vineyard beside the garden. It makes the home look friendly.

The Niagara is considered a late grape, but it matured on my place almost as early as the Early Victor. It would be a good one if it was as hardy as the Concord.

We have some varieties that have pollen too weak for good fertilization. These need some help from the bloom of stronger stock.

#### DISCUSSION OF REPORT.

**PRESIDENT HOUK:** I can fully indorse the use of fungicides to prevent black rot of the grape. On vines not sprayed there was some rot, but none on those properly sprayed. Heretofore I have regarded the Vergennes as among the most desirable variety—a good keeper. But it did not sustain my expectations during the present season. The Noah was wholly destroyed by mildew. The fruit is inclined to drop, like its parent, the Elvira. The Francois B. Hayes, a seedling of the Concord, is the best of all such seedlings. Following the Concord, the Norfolk is desirable. The Rochester is one of the very best sorts. For early ripening, Peabody of Rickett is good. Its main objections are its delicate leaves, which suffer from the attacks of defoliating insects, and the attraction of its fruit to birds. The Woodruff is desirable. Its fruit clusters are sometimes a little defective. The El Dorado is also defective in its fruit clusters. We have a seedling of this variety, a decided improvement on the parent. Another very fine sort is Yaeger's No. 100. It is somewhat foxy in quality, like the Perkins, but it is healthy and does not suffer from diseases, as the Concord and others. Our valley is well adapted to grapevine culture, and is attracting the attention of experienced vineyardists.

On motion, the session adjourned to 1:30 p. m.

#### AFTERNOON SESSION.

THURSDAY, December 10, 1891.

President Houk in the chair.

The following reports were delivered: From the Standing Committee on

#### FORESTRY IN SOUTHWEST KANSAS.

BY E. T. DANIELS, KIOWA.

The summer of 1891 in southern Kansas was very favorable to tree growth, and young groves that were well cultivated made a remarkably fine growth. Older groves did well also, except where the ragweed had taken hold.

This weed, where it is permitted to spread in a young grove, will, if unmolested, surely prove its destruction. If, however, a grove when it is first planted receives, as it should, two or three years' thorough cultivation, the trees will get such a start that this deadly foe to forestry cannot take possession. Although low ground is preferable for tree growing, the groves on upland that have been well cared for have made a very satisfactory growth. The black locust seems to be taking high rank as a forest tree for this region, on both high and low ground. The same may be said of the black walnut. The ash, box elder and ailantus do well on nearly all locations. The soft maple and catalpa grow finely on low, moist ground. The Russian mulberry is fine for wind-breaks, and for its fruit; some varieties are very acceptable for culinary uses, in the absence of better fruit. The fruit is of greater value, however, as food for poultry and birds, as they will not molest the small fruits—grapes and cherries—while the mulberries last, which is about three months. This is an important fact for fruit growers. One variety of this fruit,

which is white, and very sweet, is much preferred by our feathered friends, and they will eat little else while it is plentiful. These Russians may be readily grown from cuttings. The Osage orange is a tree that is too much neglected. Although it is of rather slow growth while young, it does better with age, and ultimately makes a splendid tree. The wood is of very great value for many uses, and is almost as indestructible as iron. Among the evergreens, the native red cedar is, in my judgment, without a peer.

The success attending the labors of all those who have made a rational attempt at forestry in this south-central part of the state, is very encouraging to the would-be planter.

#### EXHIBITED PRODUCTS.

BY A. DURKEE, OF WESTON, MO.

Your committee find exhibited on the tables 130 plates of apples, which fully sustain the high character of the state as adapted to fruit culture, and frankly state that we have never seen better specimens in any collection.

1. A collection containing 50 varieties of apples and pears, by the citizens of Beloit, which is very creditable. The names of the exhibitors in this collection are not known to your committee.

2. Seven plates of apples, by J. M. Vernon, Cloud county.

3. Six plates of apples, by W. E. Vernon, Cloud county.

4. Seventeen plates of apples and one of pears, by Mr. Mitchell, Mitchell county.

5. Two plates of apples, by H. Wolverton, Washington county.

6. One specimen of very fine seedling apple, by J. H. Searger, Mitchell county.

7. Five specimens of seedling apples, two very promising, by M. B. Guard, Mitchell county.

8. One bottle of Fay currants, by A. D. Moon, Mitchell county.

9. Four plates of apples, by W. Marlatt, Manhattan, Riley county.

10. Six varieties of apples, by J. S. McGrath, Dickinson county.

11. Ten plates of apples by J. T. Maycroft, Washington county.

12. Eleven plates of apples, very fine specimens, by Wm. Cutter & Son, Geary county.

13. One plate of very fine Missouri Pippins, by E. K. Wolverton, Washington county.

14. Two bottles of fruit, preserved in alcohol, and one basket of apples, by E. H. Kern, Jewell county.

15. One basket very fine specimens of potatoes, supposed to be a seedling of the Peachblow, by L. R. Clark, Mitchell county.

16. One case of comb honey and one bottle of strained honey of very fine quality.

Your committee would respectfully recommend, that the exhibitors of these fruits donate the same to the inmates of the Industrial Reform School.

[Signed]

J. A. DURKEE,  
F. HOLSINGER,

WM. CUTTER,  
Committee.

On motion, the report was adopted, and the request of the committee as to the disposition of the fruit was cheerfully accorded by the exhibitors.

#### REPORT OF THE AUDITING COMMITTEE.

Your committee beg leave to report, that it has examined the Secretary's and Treasurer's annual reports, and find each correct.

F. WELLHOUSE,  
PROF. E. A. POPENOE,  
E. K. WOLVERTON,  
Committee.

On motion, the report was adopted.

After attention to some miscellaneous business, the session adjourned to 7:30 o'clock P. M.

## EVENING SESSION.

THURSDAY, December 10, 1891.

The exercises of this session were conducted by the Mitchell County Horticultural Society. The entertainments were of the most pleasing and interesting character. At the close, the following resolutions were submitted by the committee in charge:

### FINAL RESOLUTIONS.

WHEREAS, It is an undoubted fact that the shipments of fruits and vegetables are much greater in volume than the shipment of grain in the United States, and that their production is increasing so rapidly that the supply is annually forcing the prices down to a point at which it is becoming unprofitable, and will have to be abandoned unless the common carrier is made to realize the importance of this line of business, and to extend farther facilities, accommodations, and better rates; and

WHEREAS, The said products are, in almost all cases, loaded by the shipper and unloaded by the consignee, and carried by railroad companies at the risk of the owner, with a guaranty of payment of freight charges, entailing no loss upon the company in case of loss or damage in transit; and

WHEREAS, From the perishable nature of goods it is necessary to unload and dispose of them as soon as possible after arrival, and from the style of packages this is easily and quickly done, and does not detain the cars so long as usual with the shipment of grain: therefore, be it

*Resolved*, That in view of these facts, it is the belief of the members of the Kansas State Horticultural Society that the horticultural products of the country are justly entitled to the same classification and rates as grain; and we respectfully ask the managers of the railroads of the country to place our products in the same class as grain, and give us the same rate, feeling certain that the increased volume of business will amply compensate them for doing so.

WHEREAS, Horticulturists stand preëminently foremost in all social reforms; and recognizing the great importance of protecting the tender, youthful, human plants of our country from the destroying frosts of abuse and sin, and the careful cultivation of these precious buds into the full, beautiful bloom of womanhood; and

WHEREAS, This Society, through the kindness of the citizens of Beloit, and courtesy of the superintendent of the Industrial School for Girls, enjoyed the pleasure of visiting this worthy institution, and were profoundly impressed with the great reformatory work of this institution, and the fitness of the noble women in charge: therefore, be it

*Resolved*, That we, in convention assembled, do most earnestly congratulate the citizens of the great state of Kansas in establishing such an institution for the training of the girls of our state and preparing them for usefulness in active life; that we recommend this institution of industrial training to all persons interested in the great work, and urge them to visit it at their earliest opportunity; and be it further

*Resolved*, That we earnestly commend this and kindred institutions to the care

of the legislative department of our state, and urge that such financial assistance be given as will enable them to successfully carry on the well-begun work. Be it

*Resolved*, By the State Horticultural Society, in convention assembled, that we do hereby petition the legislature of the state of Kansas, at its next session, to enact a law having for its object the enlargement of the grounds devoted to the use of our common schools, and providing for the planting, cultivation and protection of shade trees thereon.

*Resolved*, That this Society hereby tenders its sympathy to our old and respected brother, E. T. Byram, of Jewell City, Kas., in his severe illness.

*Resolved*, That we do hereby extend our most sincere and grateful thanks to the citizens of Beloit and vicinity for such an unprecedented welcome, assuring them that we will ever bear them in kind remembrance, and when we have returned to our various homes, and our minds wander back to Mitchell county, it will always be accompanied with pleasant recollection.

On motion, the report was adopted.

F. W. Dixon read the following paper:

### INSECTICIDES AND FUNGICIDES.

BY WM. STAHL, OF QUINCY, ILL.

I can speak of spraying from experience—an experience in this line as extensive as that of any person in the country, I believe. I first experimented with spraying eight years ago. Then, as now, I was extensively engaged in buying and shipping fruits, as well as raising them. That year the black rot of the grape was very bad in the localities from which I usually shipped this fruit. In fact, about the only marketable grapes I found that year were on a strip of sandy ground, between the bluffs and the river, at Nauvoo, Ill., a point that for 40 years has been the center of a noted grape-growing neighborhood. That year the rot ruined the crop on the upland and bluff lands. The grapes on the sandy strip just spoken of brought me as high as \$2 a basket in the St. Paul and Minneapolis markets. They were so profitable to the growers, as well as to me, that I was induced to experiment to prevent the rot. Among other things, I tried spraying, using quite a number of mixtures—some that I had heard of, and some original with myself. But I did not get the right remedy until the season of 1888; that season I sprayed in a small, experimental way with the Bordeaux mixture. The results were such that the next season I made my experiments with it more extensive. That year it was clearly demonstrated to me, and to some of the neighboring vintners, that I had found the remedy so long sought after. The result was, that in 1890 quite a number of us sprayed, and a yet greater number sprayed the past season, while the past season we did the work yet better as the result of increased confidence and experience. Let others speak of the results. Said the *Nauvoo Rustler*:

All are satisfied as to the virtues of spraying, as those who have not sprayed this season have lost from 80 to 95 per cent. of their crops from the rot, while those who sprayed did not lose more than from 1 to 5 per cent. The efficacy of spraying apple, peach, pear, cherry and plum trees has been established, also, among our horticulturists, and hereafter the spraying of their trees will no doubt be general, as all concede that the secret of success has not only been discovered, but also demonstrated before their very eyes.

Last September the editor of the *Farmers' Call*, of Quincy, visited my fruit fields, and, as a result of his visit, wrote in his paper:

We do not think we have ever before seen grapevines so heavily laden, and not one grape in 100 was affected with the rot; while only a short distance away vineyards on the same soil and under like conditions, except that they had not been sprayed, were so badly affected with the rot that their crops

will not be worth gathering. In some vineyards a row, or a part of a row, through the middle, had not been sprayed, as a test, and in every case the vines not sprayed were badly affected with the rot, and the fruit will not be worth the gathering, while on either side the foliage of those sprayed was little affected, and they were heavily loaded with well-nigh perfect fruit. Undoubtedly the fullest plum tree we have ever seen was one that had never matured a crop before, on account of Curculio, etc. It was thoroughly sprayed this year, and the result was an enormous yield, and of perfect fruit. Mr. Stahl has demonstrated beyond a doubt that the Codling Moth, Canker Worm, Apple and Plum Curculio, pear and quince leaf blight, grape rot and mildew, etc., can be prevented or destroyed by spraying with the proper mixtures.

What has been my experience has been the experience of many. Doubtless you are familiar with the experimental work in spraying that has been done by the Department of Agriculture and the state experiment stations. So far as I have been able to learn, the results of this experimental work have been altogether favorable to spraying. I would not underestimate the importance and value of this experimental work; I consider it essential to the steady advancement of our agricultural and horticultural interests. Yet, I must confess, I attach a higher value to the mass of evidence that I have collected, in the shape of personal letters to me from more than 1,000 fruit growers who have tested spraying the past season—field tests, not tests on a few feet, but tests on acres, by practical men in the actual business of fruit growing. It is impossible for me to quote from any considerable number of these letters. Your time will not permit, nor is it necessary. But I cannot refrain from giving an extract from the letter of Mr. Frank Wellhouse, of Fairmount, your state, the largest apple grower in the country. He says:

We sprayed about three acres on the 15th of April, or just before the buds opened, as an experiment. Our object in this was to kill the Canker Worm, Tent Caterpillar, and Tarnished Plant Bug, all of which were at work at that time, and we succeeded; but we accomplished the same thing by spraying after the bloom had dropped. Spraying commenced in earnest on the 28th of April, with three machines, and was finished on the 27th of May. We sprayed 160 acres twice, equal to 320 acres once, and 277 acres three times, equal to 831 acres once, or a total of 1,115 acres at a single spraying. To do this, we used 60,000 gallons of water and 600 pounds of London purple, and it took 46 days to do the spraying; so that the expense stands thus: 46 days with team, at \$2.50 per day, \$115; 600 pounds London purple, at 10 cents per pound, \$60; total, \$175; or a little over 15 cents per acre, and about 1½ mills per tree for each spraying. We think we can reduce this expense another year at least one-fourth, and possibly one-third, by fixing our ponds of water more conveniently, and a few other changes. The Canker Worms were getting quite too thick in one block of trees, and we have entirely destroyed them. The Tent Caterpillars were numerous in places, and but few of them were left alive. The Tarnished Plant Bugs were thick, and did us serious damage last year, but this year, after we had sprayed the second time, we could not find any of them alive. Fully 50 per cent. of the Codling Moth were destroyed—some observers say 75 per cent.

Others bear stronger testimony. Pardon me if I quote from one or two other letters. Mr. E. Clark, Olivet, Osage county, Kansas, says:

I sprayed Jonathan, Winesap, Rawle's Genet, Stark, Ben Davis, Limber Twig, and Fameuse. The Stark and Genet have the most worms. I sprayed in May, at the proper time, and again on the 15th of June (could not spray sooner on account of heavy rains). My apples were clean of worms; have the finest crop of apples that I ever had. I had to prop the trees, but still the limbs broke on lots of them. My whole crop will make me 80 per cent. of fine apples, clean of worms. I compared my Ben Davis apples with my neighbor's, mine being a little above 80 per cent. clean, while his were 90 per cent. wormy. I had but one plum tree, Lombard, four years old, around which I had to build a scaffold to hold up the fruit. It had at least five bushels of fine plums on it, while my neighbor's plums all rotted and fell off. I would not take \$100 for my sprayer and do without it, for I have gained 70 per cent. over last year.

Mr. John F. Williams, of Lawrence, Douglas county, Kansas, writes:

I sprayed all my apple trees—about 300. They are eight years old. Last year and the year before they bore, but not so heavily. The fruit was mostly large and smooth, but nearly every apple had a worm in it. This year the trees are very full; the apples are large, smooth, and nicely colored, and I think not more than one in 25 has a worm in it. I noticed one tree of Jonathans (I have about 30 of them) which stood near the fence so that I could spray but one side of it, while the apples on the side I did



not spray were nearly all wormy. Those I could reach were all right. I sprayed but once, just as the bloom was falling. I also sprayed my plum trees—about 50 Wild Goose and Miner. They have borne a very large crop of plums, the nicest in our market, and none wormy. I am so well pleased with my experience in spraying that I am glad to have an opportunity of telling it. It pays.

Now, the point is: How were those results obtained, and at what cost? You will note that Mr. Wellhouse found the cost of spraying his orchard to be, per spraying, a little more than 15 cents per acre. This will be about the average cost, for while he got his London purple cheap, on account of buying so much, he made the solution very strong—too strong, I think. The remedy for the Canker Worm, Codling Moth, and the Curculio of the apple and the plum, and it is an effective remedy, is the London purple solution, made by mixing one pound of London purple with sufficient water to make a paste. This is then stirred thoroughly into a pail of water and allowed to stand over night. This is next strained through a coarse cloth or fine sieve into 100 or 150 gallons of water, for use. Fifty gallons of this will spray an acre of the average-sized trees in an orchard; and the pound of London purple will cost 15 cents. Trees should be sprayed with the London purple soon after the blossoms fall, when the apples are the size of a pea, and again in a week or 10 days. To destroy the Plum Curculio, spray three or four times, at intervals of a week or 10 days, beginning as soon as the blossoms have fallen.

For the black rot and mildew of the grape, pear and quince leaf blight, potato blight or rot, etc., the Bordeaux mixture is used, made as follows: Dissolve 6 pounds of sulphate of copper (blue vitriol) in 16 gallons of water. In another vessel, slack 4 pounds of lime in 16 gallons of water. When this has cooled, pour it slowly into the copper solution, being careful to mix the fluids thoroughly by constant stirring. Now, as to the cost of this: The lime costs very little, as you know, and 100 pounds of the copper sulphate will cost only 7 cents a pound. For preventing the black rot of the grape, spray in the spring, after the vineyard has been pruned and put in order, but before vegetation starts; again, about 10 days before the flowers open; the third time, when the flowers are opening; and from this on every three weeks until the fruit begins to color. To prevent leaf blight of the pear and quince, spray with the Bordeaux mixture five times, beginning when the fruit is the size of peas, and thereafter at intervals of 12 or 15 days.

To destroy suctorial or sap-sucking species of insects, including Chinch Bugs, Squash Bugs, plant lice, hop lice, bark lice, leaf hoppers, Aphis, etc., the kerosene emulsion is used, which is made by dissolving one-half pound of hard soap in four pints of water by boiling. Only the best whale-oil soap should be used, but it costs only 15 cents per pound. To the solution just named is added a gallon of kerosene, and the whole is agitated briskly until a stable mixture is formed. This agitation is best accomplished by using a force pump, and pumping the mixture with force back into the vessel that contains it. The emulsion is diluted with 10 parts of water for use. It will be seen that a pound of the soap and two gallons of kerosene—total cost, 40 to 45 cents—will make 30 gallons of the emulsion diluted for use.

It will be noticed that the cost of the mixtures used in spraying is inconsiderable; that they are made of well-known and simple ingredients; that there is not necessarily the least danger in their preparation; and that preparing them is not beyond the intelligence or capacity of the ordinary individual. One other item in the cost and practice of spraying is yet to be considered: I refer to the pump.

A good pump does not cost a large sum, but I must warn you not to buy a low-priced pump, one costing less than the figures I shall presently name. You cannot reasonably expect to get serviceable pumps for less amounts, and you can rest assured that you cannot get such pumps unless you pay reasonable prices for them.

The manufacturers of spraying pumps are neither fools nor philanthropists, giving their goods away, or even selling for less than cost. I know of nothing more vexatious or possessing greater capabilities to inflict loss, compared with its seeming unimportance, than a spraying pump that will not spray. Inferior pumps that would not work, or that would not do good work, have done more than all things else to retard the progress of spraying, and the consequent freeing of our orchards and vineyards from insects and fungi. Perhaps, for the person that has only a very few vines or trees to spray, the best pump to get is a simple one that can be placed in a pail, and which will cost \$5 or \$6. Others should get, for spraying vines, shrubs, etc., a Knapsack sprayer, of which a good one can be got for \$12 to \$15; and for spraying trees, a barrel pump, of which a good one can be got for about the same figures. The large orchardist will want a complete tank sprayer, of which some sell as high as \$75, and are worth it. A good pump, used with reasonable care, and properly stored when not in use, will last for years; hence adds very little to the cost of spraying.

One point more, and I am done. Mr. H. M. Schall, of Ottumwa, your state, writes me:

My apple crop is fully 50 per cent. better in quality than last year; besides, I am confident the spraying saved my orchard from being taken by the Web Worm early in the spring, there being about 50 trees nearly stripped before they were noticed. In three days after spraying with strong London purple there was scarcely a worm visible. It was a very unfavorable spring for spraying, on account of so much rain.

Mr. Schall is not the only one who has found that the thrift and often the life even of trees or vines can be saved by spraying. It must be considered that by spraying we get not only larger crops of fruit of better quality, but we add to the thrift and vigor of our orchards and vineyards. It has been my experience that it would pay to spray simply on account of the increased vigor and thrift of the trees and vines.

Kansas leads. A Kansan is never content to take second place. If the father of his country were alive to-day, he, being first in war, peace, etc., would be a Kansan. If a Kansan cannot be first in prosperity, as he is usually, then he will be first in adversity. When a Kansan can no longer boom his boom, the flatter he gets the better he is suited. I repeat: he must be first, or not at all. And in just 100 cases out of a hundred he is first, and he continues to get there. Hence, I feel that I may safely leave this matter of spraying in your hands, knowing that anything so profitable and desirable will be heartily adopted and judiciously practiced by the intelligent, progressive fruit growers of Kansas.

#### REMARKS ON THE PAPER.

PROF. E. A. POPENOE, Agricultural College: The paper claims too much, in that London purple will not destroy fungi, or check diseases caused by them.

The Committee on World's Exposition offered the following

#### RESOLUTIONS.

Your committee to whom was referred the communication from the chief of the horticultural department of the World's Columbian Exposition beg leave to present the following:

WHEREAS. For the maintenance of the good name of our state, and for the reassertion of her position in the van of horticultural successes and progress, it is nec-

essary that our efforts be united in behalf of a proper representation of our fruits at the Columbian Exposition in 1898: therefore,

*Resolved*, That we heartily pledge our earnest work, both as a Society and as individuals, toward the success of the exhibit of our horticultural resources, first to our state exhibit, and afterward to the general fruit exhibit.

*Resolved*, That we urge upon our state legislature the appropriation of a sum sufficient to represent our state before the people of the world in the generous manner deserved by our past successes in this field.

[Signed]

PROF. E. A. POPENOE,  
F. HOLSINGER,  
E. A. TAYLOR,  
*Committee.*

On motion, the report was adopted.

The President then closed the session with an appropriate address, and final adjournment followed.

PROCEEDINGS  
OF THE  
TWENTY-SIXTH ANNUAL MEETING,

HELD AT  
WINFIELD, COWLEY COUNTY, KANSAS,

DECEMBER 6, 7, AND 8, 1892.

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MORNING SESSION.

TUESDAY, December 6, 1892.

The session was called to order at 10 o'clock A.M., in the opera house, by the Vice President, who addressed the Society in an encouraging and congratulatory manner, and then made the following appointments:

SPECIAL COMMITTEES.

*Credentials.*—Wm. Cutter, J. Mentch, and E. J. Holman.

*Membership.*—E. P. Diehl, M. Martin, and D. Doyle.

*Resolutions, Addresses, and Reports.*—F. A. Waugh, U. B. Pearsall, E. J. Holman, and G. H. Benson.

*Program.*—J. F. Martin and F. Holsinger.

*Constitution.*—M. Allen, F. Holsinger, and G. E. Meeker.

*Exhibited Articles.*—Wm. Cutter, F. Holsinger, and B. F. Smith.

*Addresses and Reports.*—U. B. Pearsall, G. Bohrer, S. C. Mason, and J. F. Cecil.

*Auditing of Accounts.*—E. P. Diehl, Wm. Cutter, and E. J. Holman.

*Suggestions for the Good of the Society.*—F. Wellhouse, U. B. Pearsall, and E. P. Diehl.

*Methods of Propagation.*—F. Wellhouse, Prof. S. C. Mason, and U. B. Pearsall.

*Railroad Rates for Attendance.*—E. J. Holman, U. B. Pearsall, and G. Munger.

Next in order was the

SECRETARY'S ANNUAL REPORT.

MR. PRESIDENT AND MEMBERS: The past season has not been one stimulating or enthusing to the fruit growers of this state, or of those states to the east of us; but it has opened up a wide field for study and investigation in new and different lines, to determine the causes which have brought disaster to the products of our industry.

In some very few localities apple orchards have been fruitful, but very largely throughout this state most of the growers will concur in the expression of our friend

Captain Diehl, of Olathe, "Have n't had apples enough for a pie; but pumpkins are plentiful, and we enjoy them."

In the old and familiar saying, "Misery loves company," there is not much comfort to those bereft of the luscious fruits of the orchard. It affords no satisfaction to the apple-hungry man to know that his neighbor is also apple hungry, or that he also has empty bins in his cellar, and finds relief only in pumpkins, scraped turnips, or pie melons.

Mooting all other causes which may have helped to create the dearth which extends almost throughout the United States, the fact that the years 1890 and 1891 were fruitful years would be sufficient cause to send the trees into a rest for recuperation of their exhausted energies, and to prepare themselves for the demands of 1893, when their product will be put on exhibition before the gaze of the assembled world at Chicago.

There is another point which, in my opinion, will mark the year 1892 as an inestimable blessing to the orchardist, although sadly disappointing at present. Lo these many years, our fruits have been pest ridden, until the losses turned the scales against us, and, while we have by various means downed our enemies in some lines by spraying, nature now has come to our relief, and, by withholding the fruits of the orchard, has annihilated the hordes which foraged upon them. In my opinion, the Codlin Moth, Curculios and all their kinsmen, for once in Kansas history, have gone to their final rest with empty stomachs—starved to death—and have died without progeny; as, with the failure of our orchard crops the wild fruits have also failed, there has not been left these insect enemies any means through which to continue their species into the following year. We have every reason for the belief that we will enter upon the year 1893 freed from them; and, with all due diligence thereafter, the prevention of their introduction in the future will be an easy task to the orchardist.

#### BOARD MEETING.

Since the last annual meeting, the Board has held one session, at which the chairs of the standing committees were filled, as listed in the program for this meeting.

#### THE THIRD BIENNIAL REPORT.

This report, covering the transactions of the Society for the years 1891-'92, should be printed at once. But owing to the omission of the last legislature to provide for its publication through an appropriation in the general printing act, I cannot give you any encouragement as to when it will be issued, or of its character, as all copy designed to compose the report must pass the scrutiny of the printing board, and may be largely rejected. But we have great confidence in the horticultural ability of the board to decide upon what portions of the copy should be published as beneficial to the practical horticulturist.

Again, as the appropriation act in support of the expenses of the Society only authorizes an edition of 2,500 copies, you can readily perceive how small a portion of the population of the state will be favored with a copy, and the necessity of all receiving a copy to pass it around among their neighbors. In size, the report may be nothing more than a pamphlet, as your Secretary is requested to condense the matter of his copy as much as can be safely done. Now, should some of your valuable speeches and papers not appear in the published report, you must not blame your Secretary, but the "eminent horticulturists" of the printing board, who will sit in judgment on the merits of your best efforts. Kansas, through the untiring labors of her horticultural people, has been deservedly awarded a place in the foremost ranks of the few famed fruit-growing states in the union. Thousands of intelligent horticulturists have settled upon her domain through the remarkable successes in

the development of her horticultural resources, which have been distributed into many of the states of the union, through the published reports of this Society in the past.

In view of these facts, I would ask, Is it wise state management to belittle so important an industry in the state's best interests, and to force her horticultural literature, acknowledged to be of the very best the states over, down to a plane among the lowest of any state in the union, where the industry is recognized as an element in the great work of promoting a higher civilization?

FRAUDS.

That horticultural frauds still stalk abroad in our state is evidenced by the letters of inquiry, of which the following is a sample of a too common occurrence:

Hon. G. C. Brackett:

FELLSBURG, EDWARDS COUNTY, KAS., February 19, 1892.

DEAR SIR—There have been fruit-tree agents through this county claiming that they were selling strictly under the state laws, and that the Russian apricot was the only variety of apricots that they were allowed to sell in this state. Is this a fact? I would like information.

Truly yours,

T. J. WEESE.

In reply, I advised Mr. Weese to obtain positive evidence, and treat these agents to the full penalty of the law, which is a fine from \$10 to \$200, and imprisonment in the county jail from 30 days to six months may be added. Whenever a few applications of this penalty are made, there will be fewer occurrences of such attempts to swindle the ignorant planter.

WORLD'S EXPOSITION.

I am requested to present to you the following circular:

WORLD'S COLUMBIAN COMMISSION,  
OFFICE OF DIRECTOR GENERAL OF THE EXPOSITION,  
CHICAGO, ILL., U. S. A., July 26, 1892.

DEAR SIR: Under the present arrangement between the World's Columbian Exposition and the railroads of the country, the latter agree to carry exhibits to Chicago at regular schedule rates, and return them to the original owner free of charge. On account of the perishable nature of most horticultural products, the above terms will be of no benefit to this large class of exhibitors, as they cannot be returned to the original shipper; nor are they in condition to be sold in Chicago after having remained on exhibition the requisite length of time.

I would suggest that all state and other horticultural societies take the matter up, at their summer meetings, and pass resolutions requesting the railroads to modify this agreement in such manner that the shippers of perishable articles may receive the benefits of a half rate, at least, to the exposition, and the same on articles which are returned.

Copies of such resolutions should be forwarded to all railroads running through the territory covered by the Society, and a copy sent to this office for reference to the traffic manager of the exposition.

This is also a question that might be taken up by the different state world's fair boards, as they will have great influence with the roads doing business in their respective states, and may result even in securing free transportation over at least part of the route for collective exhibits made by and at the expense of the state organizations.

Very respectfully,

J. M. SAMUELS,

Chief of Department of Horticulture.

NEW SOCIETIES.

During the year, only two new organizations have been effected, viz.: The Jewell county and Pratt county Horticultural Societies, each of which made a good beginning, having such active and intelligent leaders as E. H. Kern, for Jewell, and our Vice President, H. H. Cummings, for Pratt.

The season has not been fruitful, but, with returning years of good crops, the interest and enthusiasm consequent will lead the fruit growers to a closer fellowship.

On motion, the report was referred to the following committee: E. P. Diehl, E. J. Holman, and Wm. Cutter.

Then followed the

## TREASURER'S ANNUAL REPORT.

(See Department of Finances, following appendix.)

On motion, the report was referred to the Auditing Committee.

After some time devoted to miscellaneous business, the session adjourned to 1:30 o'clock P. M.

## AFTERNOON SESSION.

TUESDAY, December 6, 1892.

President Houk in the chair.

The following topic was then discussed:

## ORCHARD CULTURE.

DR. G. BOHREB, Chase: Some varieties of apple trees begin to decline when only 16 to 20 years old, caused mainly by drought. They are more enduring on soils having a moist subsoil.

G. W. BAILEY, Wellington: I have irrigated my trees by the aid of a windmill pump, and it proved beneficial; but such means used to any great extent would be profitless.

A. C. MAXWELL, Chanute: Thorough culture will add much to the longevity of trees. Starve a colt during summer and turn it out in winter time, and it will be likely to die. Just so it is with our summer-starved trees, and you call it "winter-killed."

The President suggested that the following papers be read on the subject before proceeding with the discussion:

## ORCHARDING FOR NORTHWEST KANSAS.

BY JAS. DUNLOP, OF DETROIT.

The first thing to be considered in planting an apple orchard on our western Kansas prairies is the most suitable location. From my own experience, and in looking around over the country, I would always choose an eastern exposure for an upland orchard. All the orchards that I have seen in this part of the state planted on an eastern slope, and that have had reasonable care, have been a success. Bottom lands with a considerable admixture of sand grow the most thrifty trees, but they are longer in coming into bearing. Never plant on bottom land or gumbo soil, for the reason that when the ground gets wet the trees will lop over. Protection, by planting a belt of rapid-growing trees around the north, west and south sides, is an absolute necessity—say not less than four rows, and not farther apart than seven feet each way. As they get larger they can be thinned out; one row and a neatly trimmed Osage hedge is sufficient on the east.

The next thing to be considered is the preparation of the ground. Plow well in the fall and again in the spring, as early as the soil is friable, harrow smooth, and mark off, if upland, 30 feet, if bottom land, 40 feet apart each way. Get your marks straight. Now you are ready for the trees. Leave tree peddler severely alone. Go or send to some reliable nursery, as near home as possible, and have your trees taken up fresh. Heel them in as soon as they arrive, and, if the soil is rather dry, water them. If you can, choose a cloudy time to plant. I have not found puddling the roots of any advantage. Do not plant trees more than two years old; my choice is thrifty one-year-olds. When planting, cut off side shoots, if there be any. Holes

need not be dug any larger than will receive the roots without crowding, say 2 to 2½ feet for one- or two-year-old trees. Lean the trees slightly to the southwest.

The only crop I would recommend for a young orchard would be some small, early-ripening variety of corn. Cultivate thoroughly both ways, and, as soon as ripe, cut up and shuck. As soon as the corn is cut, haul out rough barnyard manure and spread around the trees, covering an area of six or seven feet for each tree, keeping it clear of the body of the tree. An ordinary two-horse load is sufficient for eight trees. Spread it over the ground before commencing to plow the following spring. Keep up manuring as long as any crop is grown among the trees. In plowing, throw the furrows from the trees one year and to them the next, so as to keep the ground level, and always plow across the slope. Keep planting to corn for five or six years, or till most of the trees commence bearing. For the western part of this state, I would not sow clover or any of the perennial grasses. I have had most success cultivating with a sharp disc harrow, commencing before any weeds start in the spring and keeping it up till about July 1. Use a smoothing harrow after the last cultivation of the season, and if weeds start, use the mower.

Trees must be headed low, or they will be ruined by sun scald and borers. I would start the head not more than 15 inches from the ground. Prune only enough to balance the tree, and cut out chafing branches and water sprouts. When they begin to bear, the weight of fruit will open the heads sufficiently. If borers appear, cut out with the knife, or use a few drops of kerosene; but by far the most effectual remedy for the borer is heading the trees low, and, by good, clean cultivation and manuring, keeping up a vigorous growth.

There are other diseases to which the apple orchard is subject, the description and treatment of which I will leave to more experienced horticulturists. Before closing, however, I would state that the ravages of the Codlin Moth can be kept in check by spraying with the arsenical solutions. For directions to make and apply, see the second biennial report of this Society.

## ORCHARDING FOR SOUTHWEST KANSAS.

BY L. W. LEACH, OF KINGMAN.

Orchard culture in southwest Kansas is beset with many difficulties that take courage and perseverance to overcome. But notwithstanding the high winds, droughts, gophers, rabbits, and insect pests, the horticulturist may become fairly successful by adopting the proper means for combating the difficulties to be encountered. In the first place, it is important to make a judicious selection for the location of the orchard. From my experience and observation, I would select bottom land, or land where water can be reached in a few feet from the surface, so as to have the benefit of subirrigation. If on upland, where these conditions cannot be had, I would, if possible, select a northern slope, so that the orchard would not have the direct rays of the sun.

The preparation of the soil is another very important matter in setting out an orchard. The sod should be thoroughly subdued; the ground deeply plowed, and well pulverized. Another indispensable condition is a good windbreak, especially on the south, but would be of great advantage on the west and north also. On bottom or moist land, I would plant cottonwood; on upland, box elder and Russian mulberry. The gopher has been a great pest in orchards in this part of the state, especially doing great damage to apple trees by eating the roots off. The best means I have found for exterminating them has been by poison. Insert a little strychnine in a small piece of potato, and drop it in their runs and cover up, and that will be the last of the gopher. For preventing rabbits from barking the trees, I use news-



papers out in strips, wound around the tree, and tied top and bottom with grocers' twine. Spraying with insecticides will be employed in the future to counteract the injurious effects of the Codlin Moth and the numerous other insects that infest the orchard. It is my firm belief that not more than one-fourth of all the fruit trees that have been planted in this section of the state are alive to-day. I do not attribute this condition of things so much to natural causes as to the ignorance and carelessness of the majority of people in planting and caring for trees thereafter.

A person, after complying with the conditions named, and having good, healthy nursery stock, properly planted and cultivated, and necessary precautions taken to prevent damage from gophers, rabbits, and insects, may, in a few years, confidently expect to be amply repaid for the labor and capital expended. The fruit crop for the present year has been an entire failure, with the exception of small fruits, which were about a half crop. There were several days during the time the trees were in bloom that we had a very cold and damp northeast wind, which seemed to blast the fruit. It even killed a great many of the leaves on the northeast side of the trees. Our state Society has been a great advantage in disseminating horticultural knowledge, but few, comparatively speaking, receive the reports and are benefited by their teachings.

#### ORCHARDING FOR CENTRAL WESTERN KANSAS.

BY J. S. DUNN, OF GARDEN CITY.

Prof. Chas. S. Sargent, in an article in the *North American Review*, calls this the "debatable ground, where, if trees are planted and they thrive, the plain is pushed back a little." And your honorable President, in his semiannual address, June 6, 1883, tell us that the opponents of tree culture on these treeless plains tell us, "that tree plantations here must be a failure, because trees do not grow on the plains." So it must be, if these gentlemen are right, they can never be made to grow. As God has not planted trees here, it is best for man to let tree planting alone. "They tell us," he says, "because so many have failed, it is useless to attempt tree culture on the plains." And yet we of southwest Kansas have kept pushing back the plains, little by little, until the "Great American Desert," the "treeless plains," is pushed across the western line of Kansas into Colorado. If anyone doubts this, let him come to Garden City and see the shade trees on our streets, set out in 1883, hundreds of them from 14 to 18 inches in diameter, or let him visit the timber claims of Messrs. Hopper, Pike, and Fulton. In my garden is a locust grove. It contains 1,100 trees, grown from seed planted in June, 1891. Some of these are now 10 feet high and two inches in diameter. They have had no special care and no irrigation.

But what about fruit trees. Will they grow and fruit successfully? Let us here quote facts. Mr. Worrall planted 15 acres with one-year-old apple trees in 1881 and 1882. Some of these commenced bearing in 1884, and continued to bear every year since. For the years of 1887 to 1891, inclusive, he has had an average of 1,000 to 1,200 bushels of apples. This year (1892) the crop comes nearer to a failure than any since 1887. His plums, peaches, cherries, grapes, gooseberries, raspberries and strawberries will compare favorably with the product of any other section of the country. In 1879 this farm was wild prairie land.

I could cite many other fruit farms which have as fine orchards as any in the state. But suffice it to say, experience has demonstrated that orchards are growing and fruiting successfully in this the Arkansas valley. I believe from the evidence now found, that this valley is destined to equal any other portion of the state in its adaption to profitable fruit culture.

DISCUSSION.

J. F. MARTIN, Winfield: Thorough cultivation of the surface of the land will prevent its crusting, and thus counteract, to some extent, the severity of droughts.

H. A. EAREHART, Kellogg: I am satisfied that farmers and horticulturists need not fear a serious injury from severe droughts if the land has been deeply plowed and well surface cultured. Peach trees will be more fruitful under such treatment than when left under the slothful treatment often given them.

MAJOR HOLSINGER, Rosedale. I have noticed that shallow culture often produces the best corn, and shallow plowing tends to the same result.

M. ALLEN, Hays City: The failure of the apple crop this season is due to continuous saturation of the atmosphere and land by rainfalls during its early stages. They formed and grew to the size of hickory nuts, and then dropped, which could have been prevented by a thoroughly-stirred condition of the land and a system of open drainage. I am not in favor of pruning to any extent whatever.

D. DOYLE, Oswego: I am in favor of deep culture as the best means for continuing apple trees.

Col. U. B. PEARSALL, Ft. Scott: If the theory of Major Holsinger is correct, all tile drainage, etc., is a fraud. In our work we plow deep and stir subsoil, and never dig holes for the trees any deeper than the ground is stirred. Thorough cultivation prevents solidifying tendencies—a condition producing injurious effects both in season of heavy rainfalls as well as of drought.

Dr. G. BOHREB, Chase: I prune off all water sprouts at the collar and in the heads of my trees. The land is very rich, needing no manure, and I will venture the statement that my orchard is the peer of any in the country.

WM. CUTTER, Junction City: There are a few orchards in my county which have borne a fair crop of fruit this season. These are on low lands and protected with timber or high bluffs. The valleys are alluvial soil and penetrable, and contain quite a quantity of marl. For orchards, the subsoil should be stirred, but not turned to the surface. Conditions creating and retaining moisture should be sought and maintained to produce longevity and fruitfulness.

D. DOYLE, Oswego: The best fruits found in Labette county are in orchards on bottom lands.

THE PRESIDENT: Planters in the Arkansas valley prefer lowlands.

B. F. SMITH, Lawrence: I prune my apple and pear trees in October, just as the leaves begin to fall.

Discussion was closed.

COUNTY REPORTS.

Crops in 1892, and conditions of plantations:

CLAY COUNTY—By E. F. Walters, Wakefield: All crops generally light. There were a few exceptional localities, where the apple crop was good.

ELLIS COUNTY—By M. Allen, Hays City: The early sorts of apples and the winter variety, Rawle's Genet, and grapes were a good crop; in fact, were more abundant than in any season before.

GEARY COUNTY—By Wm. Cutter, Junction City: All classes bore a light crop, excepting grapes, which were abundant.

LEAVENWORTH COUNTY—By E. J. Holman, Leavenworth: Apples—the Baldwin and Oldenburg bore full; Keewick Codlin and Gravenstein, fair crop, but generally the yield was light. Small fruits—Snyder blackberry, Souhegan, Palmer and Hopkins raspberry, fair crop. Other sorts, light.

**RILEY COUNTY**—By Prof. S. C. Mason, Agricultural College: The apple crop, generally, a failure. Grapes, a good crop.

**SHAWNEE COUNTY**—By Jas. Priddy, Topeka: Of apples, the York Imperial bore full; other sorts a failure. Grapes, not heavy, but excellent quality. Sprayed vineyards appear healthy. Apple trees cast their foliage early in the fall.

**WYANDOTTE COUNTY**—By F. Holsinger, Rosedale: The early sorts of apples, as Keswick [Codlin] bore the best crop. Cherries, light. I believe the cause of failure due mainly to the influence of electrical currents. The Missouri Mammoth quince yielded a heavy crop. Of small fruits, grapes, currants and gooseberries, heavy crops.

**DOUGLAS COUNTY**—By B. F. Smith, Lawrence: Apples a failure, excepting the Rawle's Genet; grapes, raspberries and blackberries yielded fairly well.

By Dr. A. Newman, Lawrence: I have 400 bearing apple trees, 100 of which yielded 350 bushels. Varieties fruiting: Early Harvest, Red Astrachan, Hubbardston, Fall Orange, Fameuse. The orchard is well protected with wind-breaks.

On motion, the session adjourned to 7:30 o'clock P. M.

## EVENING SESSION.

TUESDAY, December 6, 1892.

President Houk in the chair. County reports continued:

**FRANKLIN COUNTY**—By Mr. Lester, Ottawa: All classes of fruit crops were fair in quality and quantity, excepting apples, which were a light crop.

**JOHNSON COUNTY**—By E. P. Diehl, Olathe: Conditions and crops similar to those reported for Douglas and Wyandotte, excepting the quince crop, which is not as abundant as reported for the last-named county.

**RENO COUNTY**—By G. H. Benson: Apples and cherries failed, the first time for many years. Small fruits, fairly good; grapes, medium; pears, light crop. Salt applied to the land around pear trees proved an advantage. Some Orange quince trees and the Mariana plum bore a full crop.

**RICE COUNTY**—By Dr. G. Bohrer, Chase: Apple and peach trees bloomed profusely, but commenced dropping as soon as the blossoms closed. The Rawle's Genet apple was most abundant at ripening time. Cherries yielded enough for home uses; pears, a failure. The Codlin Moth infested all the apples which did not drop early in the season. Grapes were abundant, but all classes of small fruits were scarce.

**BOURBON COUNTY**—By Col. U. B. Pearsall, Ft. Scott: Apples—the main product was from Oldenburg and Red Astrachan trees. The first succeeds as far south as Ft. Smith. A variety known in our locality as the Canada Pippin\* is one of the most productive and valuable sorts. Plums, generally, failed. Our trees were sprayed, and the fruit was perfect. The cherry was a failure. Of grapes, the Niagara and Moore's Early produced an excellent crop. All classes of small fruits were scarce, excepting the blackberry, which were abundant, and the strawberry, a fair crop. Blight was quite prevalent among the orchards. The prospects for 1893 are good, and our people are not discouraged.

**MARION COUNTY**—By J. Butler: All classes of fruit failed, excepting the Worden grape, which yielded a very fine crop.

**BUTLER COUNTY**—By J. W. Robison, Towanda: My county may be enrolled in the list of failures for 1892. For a period of 40 years, I have never seen so total a

\* This is a synonym of the White Pippin.—Szo.

failure of apples, peaches, and plums. The Missouri Pippin did not do as well as the Wineap and some other sorts. The Wealthy is the most productive variety we have, and the tree is healthy. The Mariana plum is very pungent in flavor.

**COWLEY COUNTY**—By J. Nixon, H. A. Earhart, and J. F. Martin: All classes of fruit were a light crop, excepting grapes, which were abundant, and strawberries and blackberries were a good crop. The cherry failed for the first time in many years. The Mariana plum bore heavily in 1891.

**LABETTE COUNTY**—By D. Doyle, Oswego: The conditions are similar to those reported in counties of same latitude. Of apples, the Missouri Pippin and Roman Stem bore the most fruit. The English Morello cherry and Houghton gooseberry are the most productive and desirable of their classes. Currants were abundant, though only a few have been planted. The conditions in Cherokee county are similar to those of my county.

**NEOSHO COUNTY**—By A. C. Maxwell, Chanute: The best crops of apples were grown on bottom lands. All classes of small fruits which were in good condition yielded good crops.

**PRATT COUNTY**—By H. H. Cummins, Pratt: There are only a few bearing orchards in the county, the trees being too young. My own is five years old from planting. The Missouri Pippin, Jonathan, Willow Twig and Tetofsky bore some fruit this season. Grapes were a good crop. The Medicine River currant (same as the Crandall) failed in a crop for the first time in 16 years. A few blackberries and raspberries were grown. Strawberries yielded a good crop. Blight developed in a single orchard near mine.

**SEDGWICK COUNTY**—By C. M. Irwin, Wichita: Apples and all classes of small fruits were a light crop; grapes, good. Most of the orchards are planted on second bottom land.

**SUMNER COUNTY**—By G. E. Meeker, Belle Plaine: All orchard fruits were a fair crop. Some trees bore well. The Rawle's Genet yielded the best. The fruit was generally wormy. Pears, light; grapes bore a medium and blackberries and raspberries a good crop.

Reports were closed, and, on motion, the session adjourned to 9 o'clock the following day.

## MORNING SESSION.

WEDNESDAY, December 7, 1892.

The President called the meeting to order at the appointed hour, and announced as the first exercise the report of the Committee on

## NOMENCLATURE AND NEW FRUITS.

BY G. C. BRACKETT, OF LAWRENCE.

**MR. PRESIDENT:** The duties of this committee seem to fall upon me each year. No matter how many associates I may have, or where my name may appear in the make-up of the committee, I am asked to make the report. Well, as long as I regard the subject of great importance to the horticultural interest, it shall receive attention.

Without a correct nomenclature, horticulture would be a hodgepodge affair and confusion would reign supreme, and propagators and culturists would be like that ancient people whose tongues the Lord smote because they attempted to build the tower of Babel—not one could understand the other.

The name of any variety of fruit should have an intelligent significance; that is, it should mean something, and convey to the mind of the reader some idea of the characteristics of the fruit, or by whom originated, or the locality of its origin. The color, season of ripening and value for a purpose could be represented by a word indicating its peculiarity.

In 1891, Messrs. P. Henderson & Co., the most extensive, reliable and enterprising seed and plant house in the United States, introduced a new seedling tomato, under the name of No. 400. It was of monstrous size, a single specimen tipping the scales at four pounds. Recognizing the importance of a name which would signify one of its important features, they offered a prize of \$250 to anyone suggesting the most appropriate name.

The jurors selected to award the prize decided upon the name "Ponderosa," which signifies great weight, and which, in this case, was a special characteristic.

In running over nurserymen's catalogues, and even standard lists in works on pomology, one can but be forcibly struck with the supreme absurdity and ridiculousness of some of the names. For instance, "Smock," the name of a luscious peach, "Dewdrop," the name of a fine Kansas seedling strawberry. What appropriateness can anyone discern in such names?

These are single instances of too numerous cases which might be cited.

A special committee appointed by the American Pomological Society has been laboring for years to simplify our national nomenclature, but has made little progress, because of the lack of attention by propagators and disseminators to the recommendations of the committee.

It is high time that a halt is called, and that we introduce a new era—a beginning of more intelligence in this line of work—and none can do better service than the propagators and nurserymen of the West, where the future standard fruits will be originated.

Let our work ever commend us for intelligence and appropriateness in all things.

#### DISCUSSION OF PAPER.

B. F. SMITH, Lawrence: It is claimed by some that there are already too many varieties. But there is a need of better varieties, and it is only by continued research and experimentation that progress can be made.

PRESIDENT HOUK: I can indorse Mr. Smith's statement, and believe that fruit growers should have a small seedling nursery for the purpose of growing and testing new seedlings. Valuable progress has been made in this way even in Kansas. Select the best always, and continue propagation. There is a seedling pear originating in Chase county which is early and fine in quality. Our home-grown seed is the best to use.

J. W. ROBISON, Towanda: There are two classes of new fruits and two classes of producers. Many of our present sorts are the result of accident, and from which we may obtain some valuable sorts. But exclusive and protected propagation is the most intelligent and reliable method. That is, select a variety of great merit in some features, and which it is desirable to propagate. Then select another variety possessing great merit in other desirable features. Then, with the pollen of the flower, fertilize the pistils of the other, and the result will show itself in the plants grown from the seeds saved from the fruit pollenized. The same laws governing in the improvement of animals apply equally well in plant life.

The President here announced the following message:

To the Kansas State Horticultural Society, at Winfield:

CARTHAGE, MO., December 6, 1892.

The Missouri Horticultural Society in annual session sends greetings. Our tables are full of fine fruit.

L. A. GOODMAN, Secretary.

On motion, the Secretary was instructed to respond with the following message:

To L. A. Goodman, Secretary, Carthage, Mo.:

WINFIELD, KAS., December 7, 1892.

Fraternal greetings to you all, noble workers. We wish you the highest success in your sessions.

KANSAS STATE HORTICULTURAL SOCIETY.

Next in order was a paper on

## THE TREND OF FRUIT CULTURE.

BY G. C. BRACKETT, OF LAWRENCE.

Successful fruit culture is fast entering upon a scientific plane, and will in the near future be confined to a class of expert culturists who will understandingly and energetically apply the methods determined by scientific experimentation as absolute requirements. The products of such methods will so far excel as to command the markets, and that grown otherwise will stand no chance in competition. In the early settlement of Kansas, the feeling was general that fruit could not be successfully grown on our prairie lands, but that all successful efforts would have to be confined to the skirts of forests and the timbered water courses. However, the common belief had a few exceptions, and the excepted class began the experiment which in time resulted in demonstrating that not only might the industry succeed, but also become eminently successful and a profitable investment of capital.

In those days, orchards were planted and grown as easily and with more certainty than the cereals. In proper time they became fruitful. The product was large and of fine quality; free from blemishes of any kind; and attracted the attention of horticulturists far and wide, and created an astonishment to beholders on every occasion where exhibited. But in time the enemies common to old-settled states effected an appearance, and the sound product was rapidly reduced to the minimum in quantity as well as in profit. Commencing with the first settled regions on the eastward, these enemies gradually extended westward with the march of settlement. I well remember the first appearance of the apple worm—Codlin Moth—in Douglas county, and traced its introduction to the shipments of apples from Michigan and western New York, and called the attention of the citizens, and especially members of the county Horticultural Society, to the ruin of orcharding which it portended.

The members of the county Society took the matter up at several of its meetings, and appointed a committee charged with the duty of visiting the merchants of Lawrence to protest against their trafficking in fruit grown in known infested regions. They were met defiantly, and with the declarations that as long as they could make money out of such goods they would continue to ship them in, and denounced the Society as meddling with that which was none of its business. Through the mercenary conduct of such men, the Codlin Moth was soon distributed at every railroad station westward, and the bearing orchards were well stocked with this pest at an early day, and a few men were benefited by the profits of their trade at the expense of the many, by the introduction of one of the greatest curses that could befall the fruit industry of any state.

A man can be sent to the penitentiary for a term of 5, 10 or 15 years for burning your buildings or appropriating to his own of your property, which may not exceed in cost a few hundred dollars, while another may distribute among you that which, by increase, will in time rob you of thousands of dollars, make money out of it for himself, and go unharmed.

The warfare for the extermination of these insect depredators, the Codlin Moth, Apple and Plum Curculio, and others which attack our orchard fruit, was waged to all extent possible by the ambitious pomologist, with such devised means as crude ideas could invent, and to some extent successfully. But while we were bandaging

the trunks of our trees with old rags or papers, tacking on complete of shingles, and placing old boards and rags on the heaps of gathered apples, thus offering an allurement for the worm to enter and form its chrysalid in transformation to the perfect stage, that we might easily destroy it; and while we were following our enemy persistently, by examining all boxes, barrels, bins and baskets in which the fruit had been stored, jarring the plum and peach trees to tumble the little "Turk" onto a canvas spread for his capture, and tying mother hens or cooping them with their broods under the trees to capture or scare away this pest; and while others, catering to the appetite of the pests, attempted to allure them to destruction with bottles of sweetened and spiced juices hung to the branches of the trees—while pomologists were doing all these things for relief, a few scientists were quietly applying their energies and intelligence in the studio, field and laboratory to experimental work, for the purpose of determining more economical and effective means to accomplish the same purpose. As a result, we have insecticides given us in simple form, and methods for using them so plainly outlined that anyone possessed of common intelligence may realize great benefits therefrom. Old methods, which failed materially in affording satisfactory results, are retired, as expensive and ineffective.

So much has been said and published in the agricultural and horticultural journals concerning spraying with insecticides, I doubt not that you are all too familiar with them to need anything further at this time, only to impress you with the necessity of prompt and thorough attention to the details of the treatment, if you wish the best results.

There is another agency which is more to be feared than anything in the insect line, because equally devastating and so little understood. I refer to some of the fungous organisms, commonly known as the apple scab, rusts of the blackberry, raspberry, and strawberry, and rot and mildew of the grape. But of these I will only consider the first two, as our standing committee will effectually handle the others in their report.

Then, first, the apple scab. This disease has been quite prevalent for years past, scarcely any variety escaping its attack some years. It is quite variable in its operations. Some varieties show its presence on the leaf only, others upon the fruit, and still others on both fruit and leaf. Some years it appears early in the season, even before the blossoms appear, and again as late as in August. Most culturists only notice it in the fully developed form, on the fruit, and when its damaging work is completed. With a magnifying glass, it can be discerned upon the leaf in the first stages of development, and sometimes the eye, unaided, may clearly discover it by holding the leaf up towards the sun. The following description is taken from one of the bulletins of the agricultural experiment station at Ithaca, N. Y., and is from the pen of Prof. E. G. Lodeman:

Upon the fruit, the apple scab first forms round, dark spots, generally surrounded by a light-colored border. As these spots increase in size or run together, the portions first diseased become dry, corky, and finally crack open. Upon the leaves, the first indications of the disease are round, dark green spots, which later become almost black. Sometimes they have a smoky appearance. The upper surface of the leaves is generally attacked first, and on account of the unequal growth of the diseased and healthy portions the leaves become misshapen.

This disease has been extremely severe in most of the apple orchards of not only our own but of other states, the present season, owing to a most congenial spell of weather for its development, viz., a continuous humid atmosphere, accompanied with a continuous low temperature, just before and for several weeks after the blooming period, causing the almost total failure of the apple crop. This failure has been erroneously charged to imperfect pollination, caused by heavy rains. But such was not the cause, as the bloom was full and the flower healthy, and the fruit set

abundantly for a large crop. The young apples started as vigorously into growth as in years of heavy crops, but were checked by the devitalizing influence of this fungus, and dropped in all stages, from the size of a pea to that of double the size.

On this point, says Prof. L. H. Bailey, of the experiment station at Ithaca, N. Y., and he is accepted as good authority:

It is an almost universal opinion among growers that the weather is responsible for general failures, particularly in the case of apples, where failure is the most complete and disastrous.

It has long been supposed that cold and heavy rain at blooming time will prevent fertilization of the flowers, and the idea seems to be universally accepted; yet I know of no reason for thinking it generally true, or, at least, of sufficient extent to account for the failure of a crop. For instance, two Seckel pear trees, equally exposed and of the same age, both of which bore a heavy crop last year, stand but a rod apart, and were in bloom at the same time; one has no fruit and the other is loaded. We have all observed good crops of fruit in years when heavy rains fell at blooming time.

The wood growth during this period was stunted; the leaves small, weakly, and curled as if attacked with mildew. They did not assume a normal health until some weeks after, and when dryer atmosphere and higher temperature occurred. So marked was the debilitating effect of this period, that it was easily discernable upon that portion of the year's growth throughout the season.

In September I gathered leaves as types of the injury, while on the growth subsequently formed they were sound, full size, and healthy. The fungi was not discovered so prevalent upon the fruit as upon the leaves, and may not have been the direct cause of its falling off. As to this point it would be difficult to determine, owing to the age of the fruit at the time, but the attack of the leaves was clearly marked, and sufficient to deal a deathblow to the fruit, as subsequent development demonstrated.

It is an unquestioned fact that the impairment of the health of the leaves of any plant devitalizes the whole plant to the extent to which it occurs, and that while suffering under such a condition the instinct, as it were, of life preservation causes the plant to unload, as much as possible, all exhausting portions: first its fruit, if carrying any, and next, gradually, its leaves. This operation we see when protracted droughts occur or a dearth of plant nutrition exists in the soil from other causes. For there must be a healthful foliage maintained to secure a vigorous, free growth both of wood and fruit. On this point, Professor Burrill clearly states:

Any disease which attacks the leaves or branches lowers the vitality of the plant, causes a less perfect ripening of the wood's growth, and, consequently, greater inability to withstand the effects of severe winters. If the apple trees had been in perfect health a few years ago, there is no doubt we would have heard much less of the test winters of the early '80s.

And here I will venture the suggestion, that the short life of our prairie orchards is largely due, primarily, to the weakening and debilitating effects of these parasitic organisms—fungi, and which render them susceptible of additional injury from droughts or extreme cold whenever they occur.

As to a treatment for the prevention of attacks of this fungus, I will quote from Professor Bailey, who, during the last three years, has been giving special investigation to causes producing failures of the apple crop in western New York:

The last two seasons have demonstrated that carbonate of copper is a sure remedy for the apple-scab fungus. Three applications should be made—one before the blossoms open, one just after they fall, and another three to four weeks later. Formula for the solution is as follows:

Dissolve 1 oz. carbonate of copper in 1 qt. aqua ammonia; dilute with 100 qts. of water when ready to apply.

The cost of this treatment is estimated at about 3 cents per tree of 15 to 18 feet in height for each application, or, for the three applications recommended by Professor Bailey, 9 cents per tree, which would be more than covered by the price paid for a single bushel of cider apples.



## RASPBERRY RUST.

This disease has been among us for years past, and some years has reduced the crop of fruit to the minimum of profit, if not to a total loss. Its effects have been variously charged to sun scald, droughts, and summer and winterkilling; but these are only the results of the attacks. The fungus is the primary cause, preparing the way for the injuries complained of by parasitic exhaustion, until the host becomes so weak in vitality that its resistant powers succumb to extremes. The presence of this fungus is not generally noticed until sometime during the fore part of July, and then only upon the leaves near the ground, in very small, yellowish spots surrounded by a dark purplish border. As the season advances, it works its way upward onto the newly formed leaves, but here they are not so numerous. The spots enlarge, and, where numerous, run into the border of adjoining ones, sometimes forming a mass and entirely destroying the filling of the leaf. Later on portions of the canes will become defoliated by the diseased leaves drying up and falling off. It is then that attention is turned to the canes, which will also be found attacked. Here the spots vary from those on the leaves, being whitish, elongated patches, slightly flattened at the center, and surrounded with a purplish, raised border, as if blistered. When severely attacked, the extremities of the canes will die back and turn black, and sometimes the cane at the base of the leaf will turn black, while other portions will remain sound and apparently healthy.

As the cool weather of autumn approaches, the denuded canes will push out a new growth from the buds intended for the next season. This growth is simply a cluster of weak leaves, and the canes, in an immature condition, are killed by the winter. Canes severely attacked die during the winter, and others will be found dead on their upper side. The total injury is not perceptible until the blooming period, and sometimes not until the fruit begins to ripen, when the small, poorly developed berry and sickly looking leaves clearly reveal the extent of injury. All varieties are subject to its attacks, some more severely upon the leaves and others upon the canes. Old plants suffer greater injury than young ones, because of their lack of equal vigor, which diminishes their power of resistance. But the most vigorous growers sometimes lose their foliage, and their canes die back. In 1891, the Souhegan, Palmer, Shaffer, Gregg and Hopkins were severely injured, and in 1892 were the least injured. When any salesman offers you rust-proof varieties, set him down at once as a knave or one ignorant of the nature of his plants.

The continuation of this disease will, in a few seasons, run any variety out. The canes each succeeding year will become weaker and their number fewer.

**TREATMENT** (recommended by Prof. Wm. C. Sturgis, mycologist of the New Haven, Conn., Experiment Station): As the fungus producing this disease passes the winter in the diseased canes and leaves, a fresh crop of spores (seeds) is produced from the old spots in the spring, and the new canes and foliage are readily infected. Cutting out all diseased wood and burning it will gradually eradicate the disease. It should be cut out in the winter or very early spring, and below the lowest diseased spot. Then spray with a solution of sulphate of copper, using one pound to 10 gallons of water, and follow with three applications of the Bordeaux mixture—one just before the blossoms open, one after the fruit is set, and the other about two weeks after. The last two should be directed upon the young canes only.

In conclusion: From the foregoing it is clearly seen, that the present status of fruit culture, at least in the older-settled portions of the state, requires the assistance of scientific methods to secure the highest success. It is true, probably, that there will be seasons of successful fruitage without spraying, because the causes of failure will not occur in every season. Whenever the conditions of 1892 repeat themselves, there is no encouragement for hope to escape a disastrous failure of our apple crop;

but the rusts preying upon our small fruits are liable to occur most any season, unless arrested by effective measures.

I will close by emphasizing my opening declaration as to the requirements for successful fruit culture in the future, and leave the subject in your hands for investigation.

#### REMARKS ON THE PAPER.

MAJOR HOLSINGER, Rosedale: Thorough cultivation will avert the evils complained of in the essay just read.

COL. U. B. PEARSALL, Fort Scott: Some plum trees sprayed to suppress the Curculio, the past season, cast their leaves, but the fruit ripened in good condition.

MAJOR HOLSINGER: I have known grapevines to be ruined by removing the foliage.

THE SECRETARY: Thorough cultivation does not check fungus attacks. I am well acquainted with several orchards of apples and of raspberry plantations that could not have received more thorough culture, and yet the apple-scab fungus fairly reveled in the former, and the raspberry rust in the latter. The most vigorous trees and plants are liable to be attacked.

As to the instance cited of plum trees casting their leaves and still maturing the fruit, I am reminded of my own apple crop in the fall of 1874. The trees were rendered as bare as in midwinter, but the fruit continued to grow by the aid of sap elaborated by the young and tender bark; and it ripened in due time, but it lacked fine quality because of imperfect elaboration of the sap, its food. It has become an accepted fact by all botanists and practically intelligent plant growers, that a healthy condition of the leaves must be sustained to mature a fine crop of fruit and a desirable state of vigor in the plant.

The following reports were then read:

#### SMALL-FRUIT CULTURE.

BY MISS ANNA BOWMAN, OF LEAVENWORTH.

Once more ye small-fruit man sits him down awhile to rest and figure up his profit-and-loss account, in the little breathing spell he finds before his beds have to be mulched and vines pruned and staked. His brow seems more furrowed with care than it did last season. He does n't have the sleek, contented look of ye dealer or commission man. Why is it thus? Let us look over his shoulder and scan his note book awhile. Ah, ha! now the reason for the careworn look and threadbare coat!

"In all of my experience with the strawberry, its behavior this year was the most unsatisfactory, and in some instances completely reversed old, established beliefs in its habits. The alternate freezing and thawing during the winter and spring did a great amount of damage, and, where the mulch was not put on as soon as the ground froze sufficiently to bear up a loaded wagon, the bed yielded very little. Contrary to the precedent established in former years, the one-year-old plantations yielded nothing at all, and were so badly damaged that I plowed them under, being a total loss as far as they were concerned. From the two-year-old vines I gathered all the berries I sold, and then only about one-third of a crop. Never before did I realize so forcibly that 'all blossoms are not berries,' for the beds were one mass of bloom. They surely gave promise of an immense crop, and the croakers were heard on every side heralding the possibility of overstocked markets and low prices, when down came the rain. It poured and poured continuously, thus preventing pollinization, to the extent of carrying away the grower's hopes. Prices ruled high, but no one made any money. The general verdict was, that the crop did not pay expenses. Warfield and Bubach were in great demand, and behaved as well as could be ex-

pested under such trying conditions. Captain Jack, Mount Vernon and Jessie did nothing at all. Those who had the Michel's Early, and some growers planted extensively, got no fruit. I planted a new bed this spring with Bubach and Warfield, almost exclusively; the former fertilized with Glendale, and the latter with Jessie and Captain Jack. Watched my opportunity, but did not get plants out until May 7, which is rather late; but wet weather kept me from planting earlier. Have hoed and cultivated that bed diligently, but there are many little gaps in the rows, and the Warfield, I am sorry to note, looks as though it had been near the fire. Bubach looks thrifty and well, ditto Jessie, Glendale, and Captain Jack, and a few Windsor Chief rows, and Gandy looks immense. By the way, those who had Gandy this year did well. It was just the season for a late berry.

"Raspberry canes came through the winter looking very sickly, and the grower looked more so when he commenced to haul the fruit to market. The average price was \$2 to \$2.50 per crate, and not many to be had. One day with me prices dropped to \$1.25, but they went right up again. Red raspberries retailed readily at 15 cents, and the supply was not equal to the demand.

"Blackberries gave promise of an abundant yield, and each grower talked fearfully of overproduction. But now was the poor grower exalted beyond his most sanguine expectations. His old enemy, the middleman, doffed his hat on meeting him, approached him respectfully, and humbly begged him to fill his orders. For it had come to pass that, owing to high prices and scarcity of other fruit, the housewives had nothing put up for winter. There were no peaches or plums, and blackberries they *must* have: and behold the grower riding haughtily along, with his wagon piled high with the luscious fruit, turning erstwhile a deaf ear on those who would buy, seeking whom he could get the most money from, and getting his price readily. The average price paid was \$2 per crate. Snyder took the lead, as usual. I got \$3 per crate for the first berries. The yield from plantations properly trimmed and cultivated was excellent. From two-thirds of an acre, picking every day through the season, I one day picked 20 crates, and the next 15, which I think a good yield from so small a plantation. I have no more Taylors; plowed the last under this season.

"Currants yielded well, and averaged \$2 per crate. No trouble at all to dispose of them. Red Dutch was the only variety planted to any extent.

"Gooseberries, where well treated, paid well, \$1.75 per crate being a very good return for the crop.

"Grapes were fine, and brought fair prices to the grower. Had it not been for my blackberries, currants, and grapes, my family would have missed many of the little comforts and necessities of life, and my grocer would have eyed me coldly and distrustfully. As it is, I am just about even, I think, with no margin for profit. My orchard was almost a total loss. I have gained much experience, but I sigh as I think of Henderson's 'Gardening for Profit' and Roe's 'Success with Small Fruit.' Truly, as the poet says:

"Life is real, life is earnest,  
Fruit culture is not what it seems,  
But a hand-to-hand encounter  
With uncertainties and schemes."

#### SMALL FRUITS IN KANSAS IN 1892.

BY B. F. SMITH, OF LAWRENCE.

The strawberry crop in Kansas this year was the lightest since 1886. It would be futile and a waste of time to try to comprehend all the causes of this shortage, but we do not think it was caused from want of better culture. Many of us were inclined

to attribute the cause to the unfavorable weather, but that was only one of the factors. The varying seasons, whether favorable or unfavorable to our business, are adding experience to experience, and knowledge to knowledge. We cannot expect perennial sunshine along our pathway, nor can we make any certain calculations in any line or specialty in fruit culture. We who make a lifetime business of growing the small-fruit luxuries of life should not entertain any feelings of discouragement, but, rather, persistently continue planting, for in due season our reward will appear.

*Behavior of Varieties in 1892.*—From the information we have been able to collect, there was about half a crop of strawberries, and about two-thirds of a crop of other small fruits in our state. In Douglas county there was some difference in opinion about the most productive sorts. Among some growers the Crescent was second best, while with others it was outranked by several other kinds. On our own soil, the Captain Jack, Robinson, Warfield, Glendale and Windsor Chief were in better shape than the Crescent. These were followed by Crescent, May King, Pearl, Haverland, Mt. Vernon, Michel, and Manchester. The Jessie, Sharpless, Bubach, Cloud, Lovett's Early, Lady Rusk, Crawford and the old Wilson were the least productive. Considering the season, Atlantic, Parry, Jumbo, Gandy, Sucker State, Jersey Queen and Miner did the best they could under the circumstances. Next year the season may be so different from the past one that they will be on top, demanding a better report in their behalf. The Mt. Vernon, Robinson, Gandy, Glendale, Atlantic and Manchester are our latest sorts. With the Michel for an early berry, and some of the later sorts, one can have a longer and more profitable strawberry season than by growing only one or two sorts.

In order to fortify himself against the changing season, the berry grower should grow several sorts, and thereby avert disaster. If we had not been thus fortified this year, we would not have shipped 1,000 crates of berries, nor would we have been able to make any report to this Society.

Among the newer strawberries we have on trial, the Robinson is the best one we have tested for 10 years. We have observed it closely in several different localities on our place, and the past season, the most unfavorable one for years, convinces us that the Robinson is the best all-round commercial berry we have had in all our collection. On our soil, it is as productive a berry as one needs to grow for profit; in fact it is about as productive as the Captain Jack, and is its equal in firmness, and its lateness makes it even more valuable for commercial purposes. It is a Kansas seedling, therefore a good sort in times of *calamity*, when other sorts are short in product, or when the home markets are glutted and it becomes necessary to ship to distant points.

*Raspberries and Blackberries.*—The Souhegan is our earliest raspberry, but in Douglas county it has lost about all its friends; and owing to its becoming weak and diseased and slender in growth, we plowed up a part of our patch and raised a good crop of buckwheat thereon. Next year we intend plowing out the balance, and shall substitute better varieties. The Souhegan is a week earlier than is desired by those who grow late strawberries. It has evidently run its race, and should not be further cultivated. Even if it had continued as productive as when first introduced, it should be discarded, because we now have better varieties that are more profitable for the growers, and whose fruit will give better satisfaction. The Kansas, Nemaha and Progress were our best paying black raspberries, and the Thwack and Cuthbert were our best red sorts.

The Snyder, Early Harvest and Taylor are still the best blackberries for all purposes. Erie does well on sandy soil, and one of our neighbors expects to plant it in preference to all others on Kansas river bottom soil next year. Our latest black-

berry is Stone's Hardy, though its fruit is not as large as that of the Taylor. yet where a long blackberry season is desired it will doubtless fill the bill.

As to the culture of small fruits, we do not deem it necessary to go over the ground that has been so often traversed in previous reports. Many members of our Society, who, years ago, were seeking information on small-fruit culture, are now full-fledged berry growers.

It is the question of markets for our products that concerns us more these days than the growing of our crops. Then, a study of varieties that will suit the tastes and requirements of the consumers should be a matter duly considered. The city man is often much better posted about good fruits than some of us imagine; hence we must cater to his tastes in our selections of berries.

The low prices of berries in 1890 and 1891 created a greater demand for our fruits for canning and other methods of preserving. The dealers in fruit the past season, believing that we made false reports about the crop, were greatly surprised at the prices we asked them, and some of the dealers who quoted prices out West at \$1.50 per crate had to pay \$2 per crate to fill orders.

At the beginning of the strawberry season in Lawrence, both dealers and consumers expected prices would be as low as they were the year before; hence they stood off waiting for low prices, till one or two commission-house shippers came in from abroad and bought all the berries in sight. Much complaint was made by the berry eaters of Lawrence against the growers for being so hard-hearted and selfish as to charge \$2.50 per crate for strawberries; but we sold our entire crop to one man for that price, as we had but few Crescents, while those who had only Crescents got from \$1.75 to \$2.15 per crate.

What the harvest and market will be in 1893, we cannot foretell, but owing to the shortage of the crop of all kinds of fruit this year, the appetites of consumers will doubtless be so keen that they will not stand off for the low prices of 1890-'91. The small-fruit grower, however, should keep the fact of small acreage and a low average crop before the people in order to get good prices to start out with, and try not to crowd the markets at any place or time during the berry season.

It may be that many growers contemplate planting largely next spring, expecting to get this year's prices in 1894; but we would counsel the exercise of some judgment in the amount of acreage, and in choice of sorts that will bear transportation.

We have heard much about calamity of late years, and we hope it will do some good in the way of getting at the cause and remedy of our troubles. Now, to avoid a calamity of low prices for our products, let every small-fruit grower make a study of supply and demand; for it is a fearful calamity to have a great crop of soft Crescent strawberries, as we had in 1891, and no adequate market, nor any certainty of any price when we loaded the berries on the cars; so, friends, we hardly believe that any harm will grow out of our making a closer study of our business. The people throughout our land are studying the laws of supply and demand, free trade and tariff, more than ever before in our history, and the man, or party of men, who discovers the royal road to success in business will be the winner in the battle of life. Let us study this matter of acreage, supply, and demand, so that when we plant it will not be in total darkness, but in the broad daylight of intelligence, knowing something of what our crops cost us, and what we can afford to sell them for.

#### SMALL FRUITS.

BY D. DOYLE, OF OSWEGO.

Every farmer should have a supply of small fruits. They add greatly to the comfort and happiness of the family, and increase the value of the farm. Then plant, first, the strawberry, as it comes into bearing early, and affords one of the

best dessert fruits known; the Crescent and Chas. Downing are the best for general family uses. Plant the currant, for no garden is complete without this fruit. It succeeds best in a shaded place, such as the north side of a fence. The gooseberry should not be omitted; the Houghton is the best variety, being nearly exempt from mildew. Plant grapes; there is no healthier food for the family known. They need care, but no more than all good fruits. The raspberry and blackberry come in between the strawberry and grapes, and are excellent fruits for the table and for canning, to be used during times when there is a dearth of other fruits, as during the past year, when apples were scarce; these were valuable in the place of them.

There are diseases which attack most every kind of small fruit, and the amateur farmer often becomes discouraged. But all classes of agricultural products are also subject to diseases and insects, and if the farmer becomes discouraged in one line he will in time become so in all lines and abandon the pursuit. It will be far better for him to give attention to means which will give him control of such damaging agencies, and thus become master of his pursuit. Vigilance and labor applied to the culture of small fruits will pay as well as in any other line.

Dr. G. BOHRER then offered the following on railway rates of transportation, and moved its adoption:

WHEREAS, Railway corporations in Kansas have been and still are in the habit of granting reduced rates in fare to persons attending political and other conventions, and in numerous instances have given free passes to parties on similar occasions, without regard to the number of persons attending such gatherings, and members of the different industrial organizations in the state are refused such rates unless at least 100 persons from outside the place of holding have paid full fare going to their respective assemblies: therefore, be it

*Resolved*, That we appeal to the railway authorities having control of this line of traffic for a concession in rates of fare to the attendants of the meetings of this Society, on as liberal terms as are granted to persons attending conventions above referred to, or other public gatherings of whatsoever kind; and further

*Resolved*, That these resolutions be published in the popular journals of the state, as the Board may direct.

On motion, the Society concurred, and adjourned to 1:30 P. M.

## AFTERNOON SESSION.

WEDNESDAY, December 7, 1892.

The President called the meeting to order, and announced as in order the

### ELECTION OF OFFICERS.

On motion of E. J. Holman, Capt. E. P. Diehl was instructed to cast the ballot, as follows:

*President*—L. Houk, Hutchinson.

*Vice President*—M. Allen, Hays City.

*Secretary*—G. C. Brackett, Lawrence.

*Treasurer*—F. Holsinger, Rosedale.

Following was read the report of standing committee on

### ENTOMOLOGY.

BY F. HOLSINGER, OF ROSEDALE.

*The Imported Currant Borer.*—This enemy has, for the first time, been noticeable with me. It has been a serious drawback to successful currant growing in the East for some years. It is an importation from Europe, where it has long proved to be troublesome. In the larva state, it burrows up and down the interior of the stems, making them so weak that when in foliage they frequently break when the wind blows vigorously. The parent of this insect is a pretty, wasp-like moth, which measures, when the wings are expanded, about three-fourths of an inch across. The body is of a bluish color, the abdomen being crossed by three bands. The wings are transparent and veined, being bordered with brownish black of a coppery luster. The moth appears about the middle of June, and may be found in the hot sunshine, darting about in rapid flight, sipping the nectar of flowers or basking on the leaves, alternately expanding and closing its fanlike tail, or searching for suitable places to deposit its eggs. The female lays her eggs singly, near the buds, where, in a few days, they hatch, the larvæ eating their way to the center of the stem, where they burrow up and down the stem, feeding on the pith all through the summer, enlarging the channel as they develop in size. Within this cavity the larva changes into the chrysalis state. In time they break the filament surrounding them, and emerge, prepared to carry on their destruction. They are principally found on the red and white currant, yet not unfrequently on the black currant. Where the stems do not break, their presence may be discovered by the sickly look of the leaves.

*Remedy.*—Cut and burn all branches found to contain the worm.

*The Peach-Tree Borer.*—The peach-tree borers are very widely disseminated. These insects strongly resemble the wasp family. They fly only during the daytime, and are quite active on the wing. They appear during July and August. The sexes differ very much in appearance; the female is much the larger, having a broad, heavy abdomen. The body has a glossy, steel-blue color, and a broad band of orange yellow across the abdomen. The four wings are opaque, and similar to the body in color. When the wings are extended, they are  $1\frac{1}{2}$  inches across. The male is smaller, its wings not measuring more than an inch. The wings are transparent, the veins, margins and fringe are steel blue, and a steel-blue band extends nearly across the middle. The female deposits her eggs on the bark of the tree, at the collar. They are very small, and are fastened to the tree by a gummy secretion. As soon as hatched, the larva works downward in the bark to the root, forming a small but winding channel, which soon becomes filled with a gummy matter. As the larva increases in size, it devours the bark and tender sapwood and causes a copious flow of gum, which soon forms a thick mass around the tree at the base, intermingled with the castings of the larva. When full grown, it is an inch in length and nearly one-fourth as much in diameter. The larvæ will be found, of different sizes, all through the winter months. The larger ones will be found with their heads up, in smoother longitudinal grooves, which they have excavated. The small ones are found in the gum, or between it and the wood of the tree.

In badly infested trees the bark will be found consumed for from one to four inches at the base or collar, often extending along the roots. This insect not unfrequently will attack the tree in the fork, which may be easily detected by the exudation of gum. When ready to change to the pupa state, the larva crawls upward to the surface of the ground, and constructs a leathery cell or structure, made from castings mixed with gum and threads of silk, and of a brown color. The pupa

state lasts some three or more weeks. It is an American insect, and works also on the plum, but there is no gum attached to its work on the plum. It, however, is seldom found in our wild plums, now that the peach seems more congenial to its requirements.

*Remedies.*—The most successful, I think, is in mounding the trees in the late spring or early summer, to the height of six inches or more; then level the ground in September—the egg laying having ceased and the moth having disappeared. The major part of the larvæ will be displaced by leveling the ground, whilst any not thus displaced can easily be removed by scraping the trunk with a knife. This, I think, is the easiest and best method, as a thousand trees a day may be successfully treated. During the past autumn, I visited some of the successful peach orchardists of Maryland and Virginia, and found this method the one most successfully used.

While visiting the Rev. David Kindig, near Staunton, Va., October 2, I found him busy with leveling the ground and carefully hunting the larvæ. This was the second effort, he having, during the month of August, gone over his trees, worming them, and then mounding again. I found his method very laborious and, I think, unsatisfactory. Having watched his man level some dozen or more trees without finding a worm, I interrogated the man, when he said he had only taken some dozen during the day, while the first time thousands were caught. The Reverend Kindig said he thought it paid if only a dozen were caught in a day. I think that, had he deferred two weeks longer the first examination, the additional expense of mounding and leveling might have been avoided; and when we take into account the stony condition of their soil, compared to our light alluvial, the expense is quite considerable. Another method, and equally successful, is by binding with screen wire cut in strips and bent around a broom handle, then sprung about the tree, being careful to insert the wire in the ground carefully; or by wrapping with long straw or swamp grass, tying it at the upper end and covering it at the base or collar with dirt, and loosening the band as the tree may require from time to time. A world of diligence is necessary to insure success in growing a peach orchard.

#### REMARKS ON ENTOMOLOGY.

J. W. ROBISON, Towanda: All species of aphids have their seasons, and in time run out, the same as other insects.

F. WELLHOUSE, Fairmount: I received a large lot of apple trees from a Linn county nursery, the roots of which were covered with aphides. They were dipped in common lye. This treatment killed most of them. The Apple Curculio is, at the present time, doing more injury to our apple crops than any other insect. Spraying with insecticides does not reach it.

WM. CUTTER, Junction City: The Apple Aphis comes from the roots, and passes into the extremities of the tree when the ground becomes very wet.

M. ALLEN, Hays City: Cold coal oil will not kill the aphids.

#### TWIG BLIGHT

Was then discussed, as follows:

DR. A. NEWMAN, Lawrence: Trees of the Keswick [Codlin] apple were killed in my orchard by blight; Willow Twig, Large Yellow Bough and Talman have suffered, but not fatally.

COL. U. B. PEARSALL, Fort Scott: The Missouri Pippin is not attacked, around Fort Scott, with blight. Cherry and quince trees were saved by spraying with Bordeaux mixture.

G. H. BENSON, Haven: Our lands are not wet. Blight appears in orchards on our uplands. Healthy trees are attacked.



On motion, the session adjourned, to afford the members an opportunity to visit a car of Louisiana products which had just arrived at the depot.

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## EVENING SESSION.

WEDNESDAY, December 7, 1892.

President Houk in the chair.

The first exercise was a report of Standing Committee on

## LANDSCAPE GARDENING.

BY PROF. J. D. WALTERS, STATE AGRICULTURAL COLLEGE, MANHATTAN.

Our state is among the youngest in the union, yet it is already dotted with old homes that need remodeling. The growth of wealth and taste has been such that comparatively few families are satisfied with their abodes and the character of their surroundings. I venture to assert that hardly half a dozen of those assembled here to-night would build another home and plant another yard after the pattern of the one they now occupy. The question of beautifying country and city residences by tasteful arrangement of buildings, walks, drives, lawns, trees and shrubs is therefore largely a question of possible alterations, of an adjustment of ideas to hampering, existing conditions.

Most homes, in the country as well as in the city, lack space—yard space—especially in front of the dwelling, and this, though it is an essential, is often hard to obtain. To appear to advantage from the road or street, the dwelling should stand back from two to six times its total height. In a suburban quarter, a building two full stories high, with usual foundation and gable, should stand not less than 60 feet from the pavement, unless the lot is very narrow or the buildings on both sides stand much closer. Rare cases excepted, it is of course impossible to push an old building back; the landscapist must, therefore, find means for making the existing space appear as large as possible. More space—a considerable expanse of lawn free of trees—should be added to one side, while the other side should be planted in a dense grove of forest or orchard trees, so as to produce the effect of a change of front. The building of a main entrance on this lawn side, and the closing of the old front door, or the changing of it to a bay window, will greatly assist in producing the desired effect, as will also the changing of the straight front path into a slightly and gracefully curved one.

Another frequent fault of our homesteads is the nearness of the barn, or at least of the cattle corrals and hogpens, to the dwelling and to the road. Where the home is on a section corner or street corner, the house usually faces one of the intersecting roads and the barn the other, or, still worse, the house is on one side of the road and the barn on the other, with hardly a tree between them. This state of things is difficult to remedy. If the barn is simply a shell of scantlings, boards, and shingles, it ought to be moved back by all means. The selection of the proper place for it is, of course, a matter of locality and convenience, so that no rule can be given, except that it should be farther from the road than the house. If the barn cannot be moved, then move all the cattle yards, pigpens, hay and straw stacks, outbuildings, lumber piles, etc., and close the entrances toward the road; i. e., have the barn face toward the farm. A little carpenter work and a coat or two of paint will do the rest. Sometimes it is possible to hide a stone barn behind a thick covering of the Virginia creeper (*Ampelopsis quinquefolia*). Sprouts of this beautiful vine can

be found in almost every timber fringe, and trellises are not required; on a stone or brick wall it will hold itself.

One of the ugliest features of a multitude of homes is the dilapidated well house and the blue-painted cistern pump, especially when they are surrounded by a labyrinth of washing utensils, milk pails, and butter churns, and when herds of grunting pigs, droves of quacking ducks and flocks of complaining chickens explore the ever-present, ill-smelling quagmire. Health and decency require its abatement. Where it is impossible to remove the whole "plant" to the rear, remove the implements, and keep the lawn clean by laying a waste drain. It is a matter of very small expense, however, to carry the water to the kitchen by means of pumps and galvanized-iron pipe. A few dollars and days' work will cover the entire expense, and the women will save as much on shoes in a few months.

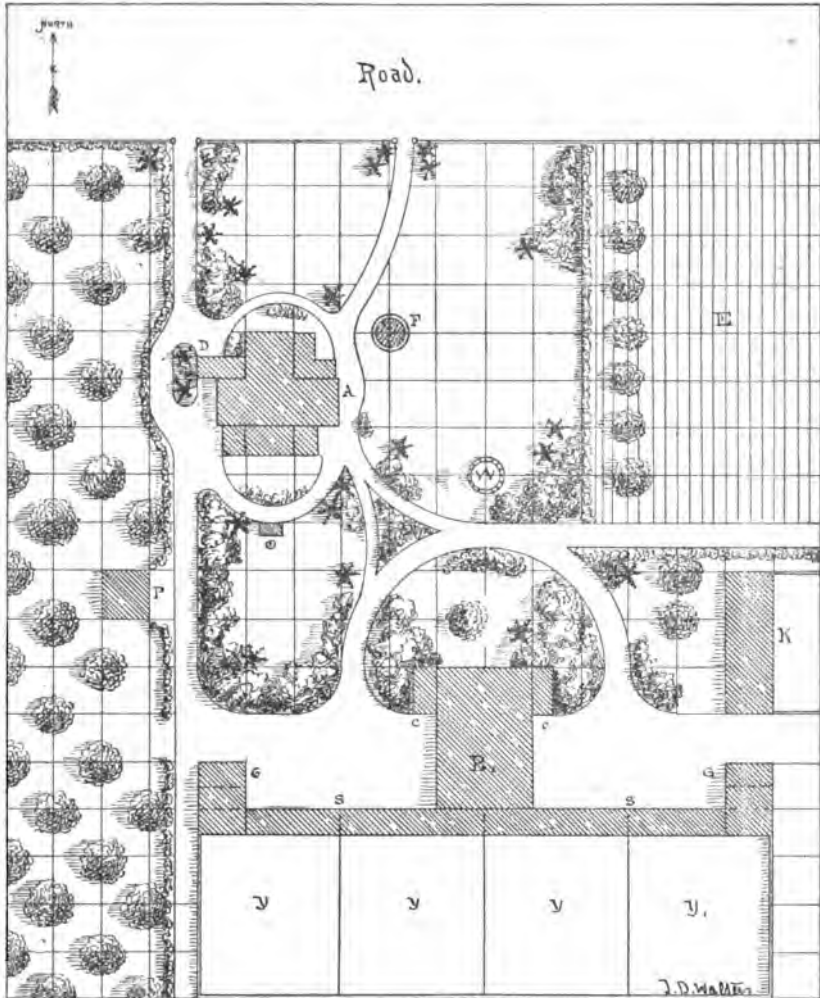
The one thing that should not be moved is the windmill—the most picturesque feature of the average Kansas home. Send the water from it to where it is needed by a system of cheap iron pipes, so that the lawn can be extended to the very edge of the platform; then paint the woodwork; plant the Wisteria and the Climbing Rose around its skeleton supports, and it will be a thing of beauty and a joy.

Of the roads and walks little need be said, except that they should be located where wanted, and never so as to transverse the main lawns. Graceful curves are more natural than straight lines, and please the eye better, but there ought to be a real or apparent reason for every curvature. The roads should be built with telford beds, and the walks with gravel macadam. Coarse cinders are also a first-class material for walk construction.

We now come to the main question pertaining to the remodeling of old-home grounds—that of the treatment of the lawns, trees, and shrubs. Trees must be cut down where they are not wanted, and new ones planted where they are needed. It is, of course, very desirable to leave many of the old trees, but none should be left where they do not coincide with the ideal landscape in the mind of the gardener. It has been said that the heaven of the average Kansan is a forest of beautiful trees, but it is safe to add that as time advances the forest will permit some sunlight to penetrate the sylvan roof. There should be a lawn in front or to one side of the building unbroken by trees or shrubs, so as to contrast by its well-kept greensward and sunny brightness with the tree groups and shrub belts. It should be large, and permit mowing with a horse mower, because, where all mowing has to be done by hand, it is often left undone. There has been a great deal of discussion of late with regard to the best lawn grass for farmers' homes. The smooth and dark-green Kentucky blue grass does not thrive west of Topeka unless it can be watered during the summer months. It starts well enough in the spring, but about the first of August, or earlier, it becomes yellow and thin. Much can be done by manuring, and more by care in cropping. Some people overdo the mowing most decidedly, even when they can use the hose to revive the grass again. My taste is for a natural lawn. Where the Kentucky blue grass will not thrive, I would plant the Texas variety, or a very dense orchard grass mixed with red clover and meadow oats. This mixture, with some care, will live, look green and natural, and produce one or two crops of first-class hay every summer.

Shade trees on lawns should not be planted in rows, but in groups, far enough apart to give every tree a chance to develop its crown. On three-fourths of all Kansas home lots the trees are so crowded that they cannot develop properly. The trunks should be trimmed up, and the branches be permitted to droop in natural and graceful curves. In the foreground, all large trees ought to be branchless for from 9 to 15 feet. The danger of sun scalding of such trees is no greater, provided they are not crowded. Every imperfect specimen ought to be cut down, especially

the poor cedars. The red cedar, the Kansas as well as the Northern variety, if kept low and given plenty of space and sunlight, is one of the most beautiful lawn evergreens; but when neglected or crowded it becomes the "seediest," and there is no patent medicine that will restore it to youth and beauty. The same can be said of the multitude of flowering bushes; these should be cut to the ground to force new



#### EXPLANATION OF PLAN.

The sides of the small squares measure 20 feet each. The tract, as shown here, less the road on the north, but including 60 feet of the orchard, measures 360 feet by 340 feet, or about three acres.

- |                     |  |                                 |
|---------------------|--|---------------------------------|
| A—Dwelling.         | P—Chicken house.   | K—Piggery and pens.             |
| D—Carriage stop.    | B—Barn.  | GG—Cribes with open drives.     |
| F—Round flower bed. | CC—Granaries.  | SS—Cattle sheds, open on south. |
| O—Outhouse.         | E—Vineyard and vegetable garden, with row of cherry trees. |                                 |
| W—Windmill.         | Y—Cattle yards.  |                                 |

There is no tank at W, the water being carried to the house, the barn, the pens and sheds through pipe lines. The open space south of the outhouse is occupied by a stationary clothesline.

shoots, or they should be dug up. The trees, bushes and evergreens that fit the plan should be trimmed liberally, but no branch should be cut off that has a diameter of more than three inches, or the wound will ultimately kill the tree, even if painted. The lopping off of the whole crown is an outrage on nature and art, and should be severely condemned. It is an exhibition of the brutal character of the amputator.

The next step is the replanting. Only those varieties should be planted that will grow well. Of our native elms, coffee beans, sycamores, honey locusts, and box elders, we know that they lived here centuries before the white man ever saw the state. They stood the droughts and storms of summer and the colds and snows of winter without the assistance of man; surely they will thrive when we lend them a helping hand, and as for beauty, they can hardly be surpassed. Add the Austrian and Scotch pine, the blue Colorado spruce, the catalpa for moist and the ailantus for dry localities, and the variety is all that could be desired.

Some people have a mania for gathering and displaying oddities. They fill their halls, parlors and libraries with all sorts of bric-a-brac, curious stones, shells, tree gnarls, roots, fossils, moss, bones, Chinese rugs, Hindoo gods, etc., until there is no place left to be comfortable. It must be expected that these will make a rarity garden and curiosity shop of their front yards. Instead of planting trees and shrubs that will adorn the place with sylvan beauty, they cultivate the Chinese ginko, the Japanese acacia, the Russian mulberry, the Michigan white pine, the European larch, the Canadian birch, the arbor vitæ, and dozens of other rarities which are possibilities only under exceptional care and conditions, and live only short lives. Not satisfied with their collection of botanical tramps, they ornament their lawns with cast-iron dogs, terra-cotta elephants, and brass gorillas; they border their flower beds with medicine bottles, line the walks with shells, build mole-hill mountains, and crown these with toy castles; they clip evergreens into umbrella forms, and convert their homes into dime museums generally. The true lover of nature and real beauty has no use for these things. The tree, the bush, the lawn, are beautiful to him when they are associated and contrasted with each other after the most perfect types of nature's art — not otherwise.

It is difficult to speak of the detail arrangement of home grounds without graphic illustrations. I have therefore added the plan of a home of a Kansas farmer, a man of sense and taste, who recently rebuilt the whole. It shows what can be done in rearranging an old homestead. Five years ago, when he bought the place, it looked quite different. The barn, which is now south of the house, stood close to the road on the east side, the dwelling had its main entrance toward the north, and the farm road was located west of the house, between it and the barn. The one bold move of pushing the barn to the rear produced every necessary condition for a complete metamorphosis of the place into one of the finest homes in the state. It furnished the necessary space, without which nothing could have been done. It gave the landscapist a chance to transfer the road to the west of the house, to open a large lawn on the east side, to transfer the main entrance from the north to the east (a better place for several reasons), to bring the windmill into view, to plant a privet hedge along the eastern limit of the lawn, to place a neat, low fence along the road, to build a carriage stop (a very desirable addition to every house), to admit the morning sun into the family room, and to gain all the needed ground for the desired ornamental planting. The home is now a model of convenience, cleanliness, and sylvan beauty.

After attention to miscellaneous business, the Society adjourned to 9 o'clock A. M. the following day.

## MORNING SESSION.

THURSDAY, December 8, 1892.

President Houk in the chair.

WORLD'S COLUMBIAN EXPOSITION was first in order, and Judge Wellhouse made a full statement of the work already accomplished, and of that to be done in the future, urging every member of the Society to lend a helping hand.

Captain Diehl offered the following resolution:

WHEREAS, It being the wish and intention of the horticulturists of the state of Kansas to make an exhibit of fruits at the world's fair in 1893; and

WHEREAS, One of the honored members of the Kansas State Horticultural Society, Judge F. Wellhouse, was elected a member at large of the board of managers of the Kansas exhibit, and by said board chosen to represent the horticultural department of the exhibit; and

WHEREAS, This Society, recognizing the wisdom and good judgment of the board in making so wise a choice, and wishing that harmony and good will may prevail between this Society and the board of managers: therefore, be it

*Resolved*, By the Kansas State Horticultural Society, now in session in the city of Winfield, Kas., that the said Judge F. Wellhouse be recognized as the representative of this Society on said board, and that we delegate to him full power to act for and in behalf of the Society in making the horticultural exhibit, and that agents or assistants may be appointed or selected as his judgment dictates; and that we, as a Society and individual members, do pledge ourselves to work with him in making a fruit display at the Columbian exhibition that will redound to the honor of the great state of Kansas.

## REMARKS.

THE PRESIDENT: During the period of this exposition will be the momentous era in the nation's existence. The character of the immigration which it will induce to settle in our state will be of the most enterprising nature. Large numbers will study our advantages, improvements, and progressed condition, which will not fail to convince them that they are of a superior character, and offer great inducements for the investment of millions of capital in manufacturing and agricultural industries.

F. WELLHOUSE: Our state has unlimited resources, and it needs capital and laborers to develop them.

On motion, Captain Diehl's resolution was unanimously adopted. Next in order was the report of the Committee on

## VEGETABLE GARDENING.

BY E. F. WALTER, OF WAKEFIELD.

The past season has been very disastrous to most varieties of vegetables throughout the greater part of the state. Owing to drought and heat, scarcity has been the rule. Potatoes, cabbage, onions, cauliflower, tomatoes, in fact, all the standard vegetables, have been short crops. The dry, hot spells that occur here more or less every year have, the past season, very forcibly exemplified the need of some system of irrigation in order to secure more certain and more profitable crops of vegetables. The time is near at hand when this question of irrigation will force itself more imperatively upon our attention. As the people increase in wealth, their needs and tastes undergo change. The luxuries of the past become necessities of the present, and demand stimulates production, people being no longer content with

"hog and hominy." We see upon every market many vegetables that have become necessities that a few years ago there was no demand for and were considered not only luxuries for the few, but impossible to grow in our climate. The production of some of these varieties is too uncertain to be profitable without the aid of water to insure a crop. The glorious days, with their brilliant and unclouded skies, that load our vast prairies with their burden of golden grain and give to Kansas the leading position among her sister states, are often destructive to our hopes in the vegetable garden. But with a moderate supply of water at hand, vegetables can be kept growing through the severest dry spells without injury, and when the drought breaks and the rains fall, everything quickly becomes luxuriant. There are along our streams and creeks countless acres that, with a moderate outlay of capital and the use of either wind or hydraulic power, can be converted into as profitable tracts of land as the much-vaunted garden plats of land speculators in many parts of the country. Ten acres, favorably situated, can thus be made to produce a larger income than any quarter section by general farming. Large crops of staple vegetables can be produced with certainty, which every year we are compelled to import from sister states no better favored than our own fair state. Of potatoes, we annually import thousands of tons, every ton of which could be profitably grown here. Cabbage, celery, onions, etc., are imported by the car load, also. Where there is a windmill and good well upon the farm, the farmer's garden can always be made to supply an abundance. Only a small outlay for pipes would be necessary in many cases to convey the water from the tanks already provided for watering the live stock. There is seldom a year that it would not pay handsomely; but how can we arouse interest in the matter, and what can we say to do so? Calling upon a well-to-do farmer neighbor last summer during very dry weather, we noticed the garden (well kept and neatly laid out) was going the way of gardens generally during a protracted drought. A well and windmill upon a gentle elevation not 100 feet away gave such excellent facilities to supply water from the large cattle trough, we urged a trial. Upon measuring and estimating the cost of pipes and hose to convey water right to the garden, we found \$7 all the outlay necessary to save the crop of early potatoes, cabbage, tomatoes, onions, beans, peas, etc., etc. Several friends in our neighborhood have put up a small tank by their windmills and laid the water to their gardens, and they always have a full supply of vegetables.

In our own garden, with a very limited system of watering, we have raised a good crop of onions, tomatoes, cabbage, egg plants, celery, etc., again this year. For experiment, we watered a plat of about one-third of an acre of Early Ohio potatoes. We dug the crop early, while the tops were green, and they were very fine and yielded three bushels of marketable tubers to each row of 60 yards in length. The rows were planted 2 feet 6 inches apart, thus making a yield, by weight, of nearly 300 bushels to the acre. If they had been allowed to mature, the crop would have been much larger. The plat adjoining was not watered, and did not yield much over 100 bushels per acre.

I must ask your indulgence for dwelling so long upon this subject, but I feel it to be a question deserving of more attention. Vegetable gardening, whether for pleasure or profit, cannot be made a success, unless the preparation of the soil receives intelligent thought and attention. All land intended to be devoted to vegetable culture should be deeply plowed in the fall, as late as possible before freezing up. Myriads of insect pests, that have hibernated for the winter, are disturbed and destroyed. The action of frost pulverizes the soil, rendering much more plant food available for vegetation. The soil becomes firm and compact, when harrowed in the spring, and in fine condition for the reception of seed. The rains and snows of winter penetrate the subsoil, the surface dries off, and warms up quickly, and, if

harrowed as soon as dry enough, evaporation is checked, and there is a reservoir of moisture stored up that will germinate almost any seed properly sown.

But we often see around our towns men who make a business of growing vegetables for market fail in this all-important matter. They haul quantities of litter from livery stables, alleys, and byways, completely mulch their land with the stuff, and call it heavy manuring. It is plowed under in the spring, leaving the soil loose and light, and full of air chambers, through which the drying winds of spring penetrate, evaporating all moisture, and, unless heavy rains fall, small seeds fail to germinate, or germinate and die. The blame is then laid upon the shoulders of the seedman. In manuring the soil, we obtain the most satisfactory results with well-rotted manure spread over the surface of fall plowing, as early in the winter as possible, and well harrowed in the spring; the cultivator incorporates it with the soil, and the tender rootlets of the young plants find it easily near the warm surface, without having to go down six inches into the cold soil to get it.

Rotation of crops is another important element of success in the vegetable garden. Certain crops, those that draw most heavily on nitrogen, as cabbage, cauliflower, celery, lettuce, spinach, egg plant, and other foliage-producing plants, are gross feeders, and require heavy manuring; from 40 to 60 loads per acre is none too heavy. These should be followed the next season by vegetables that draw more largely on potash, as potatoes (sweet and Irish), onions, tomatoes, beans, peas, beets, parsnips, carrots, etc. These will all mature fine crops without applying more manure, except a light top dressing of wood ashes, when obtainable. Wood ashes are a specific fertilizer for all classes of vegetables, and should never be wasted. They can be applied advantageously at any time, and the sooner after being taken from the stove the better. By following this system of rotation, the garden receives a thorough dressing of manure every other year, and does not get surfeited. We have for many years heard a great deal about the running out of potatoes in Kansas, and the absolute need of changing our seed every year or two for northern-grown stock. From my own experience, changing seed is not at all essential, when it has been kept properly. When potatoes are kept in warm cellars and allowed to shrivel and sprout, or where the large tubers are sold and the small ones culled out for seed and planted year after year, they must and do deteriorate. It is also bad policy to plant any part of a poor or ill-formed crop. If we adopted the same policy with our corn, it would soon run out, too; but where potatoes are kept in a cool, outdoor cellar, cold enough to prevent sprouting, and are planted, large and small, about as they grew, there will not be much more running out in Kansas than any other state. We have not changed the seed of our Early Obios for eight years, and have this year raised about 1,000 bushels of fine tubers from 6½ acres. But always fall plow, never allow a weed to grow, and never grow potatoes upon the same land oftener than once in three or four years.

#### VEGETABLE GARDENING IN NORTHWEST KANSAS.

BY W. D. STREET, OF OBERLIN.

The vegetable garden has not received the attention it deserves in northwest Kansas. The wide fields of waving, golden wheat and the long rows of growing corn have engrossed the attention of the husbandman, to the neglect of the vegetable garden, which has been too frequently left to the care of the busy housewife and the ravages of the hens. Frequent dry spells, accompanied by high winds and the rapid growth of weeds, have a tendency at all times to discourage the general farmer in the attempt to raise a good garden.

From an experience of several years in the vegetable garden in northwest Kansas, both as a home and market garden, the lessons learned are to plant early, of

standard early varieties of vegetables, and follow with early varieties for succession. Our experience in a climate of some uncertainty, and without irrigation, has taught us that it is best to get the crop grown to maturity as rapidly as possible, which reduces the chances of failure very materially, and, in many instances, saves the crop.

It is not our intention to enter into the details of varieties best adapted to our soil or climate, nor to quote a seed catalogue with elaborate pictures of monstrosities, but cannot forego mentioning a few vegetables that we have found to thrive and produce fair crops nearly every season, and to name some of those that have done best in this locality.

Asparagus is usually a good crop, but requires too long waiting for returns for most people.

Beans! Everybody knows beans. We prefer Golden Wax or Wardwell's Kidney Wax.

Beets. Early varieties, such as Eclipse and Long Smooth Red, succeed well.

Cabbage. So many have made failures of this crop that we fear to recommend it very highly, though for years we never met with failure, wet or dry, hot or cold, and have experimented with about 80 kinds, and, if confined to two varieties, would take Early Jersey Wakefield for early and Excelsior for intermediate and late, and for a hot-, dry-weather cabbage. In this line, some fine cauliflower have been raised with us, but the cost in labor and care was too great, except for someone who "don't care for expenses." But both cabbage and cauliflower can be raised if care is taken to keep the ground clean of weeds and the surface soil well stirred with hoe or by shallow plowing.

Carrots we have raised year after year in abundance.

Celery takes too much watering, and our hot, dry Septembers are too trying to give success, though by constant irrigation some very fine-flavored celery has been grown.

Corn, sweet. Perry's Hybrid for early and Egyptian Sugar will give, by about four plantings, green corn until frost.

Cucumbers, and in fact all kinds of vine products, thrive well with us. The only trouble is the bugs. We sift air-slacked lime over the vines in the morning while the dew is on to keep them away. We would advise planting two kinds of early and two of late to insure success, and then fight the bugs.

Horse-radish and many garden herbs do well. They should be planted in the lowest and most moist part of the garden. In fact, the lowest and most moist part of the farm should be selected for the garden.

Lettuce. What fine, rich, buttery lettuce we raise out here in the early spring. We like Black-Seeded Simpson and Large Hanson.

Muskmelons grow luxuriantly, and the fruit is luscious. There are so many excellent varieties that we do not know which to recommend.

Watermelon. The same may be said of it as of the muskmelon. This is preëminently a land of vines.

Onions are not quite a sure crop, but we think weeds "do them up" more frequently than any other cause. In passing, we want to speak a word for the old winter onion, that is always ready from the time the frost leaves the ground until they get too strong, along about June, though they are always strong enough. We have a row half across a 10-acre tract that brings more profit than any like tract on the farm. It never gets any care, except cultivating once in the spring, a swath of weeds mown down over them in the summer, and a little manure sometimes in the fall. As we dig a bunch, we stick one of the little bulbs back in the place, and they grow on from year to year.

Parsnips usually do well, and we advise sowing them in every garden.



Peppers sometimes do well, and are always welcomed in the preparation of many varieties of pickles to such an extent as to induce the trial of their growth every season.

Peas. No garden is complete without peas. We never fail on the early varieties, and usually succeed with some of the later kinds. "Plant early and often," is our motto.

Potatoes succeed very well, generally. Both Irish and sweet are counted on for a crop. The Early Ohio rarely, if ever, fails.

Pumpkins and squashes, like other vines, do well, and produce immense crops every year, if the bugs do not destroy the vines.

Radishes. No one need be without them in the early part of the season. Sow as soon as the frost is out of the ground, and every week or 10 days thereafter.

Salsify, or vegetable oyster, is nearly a sure crop, while spinach, for early, never fails.

Turnips need never be a failure, if several sowings are made.

Tomatoes yield an immense crop to anyone who cares for them, and will, in a dry time, give them plenty of water, not over the vines, but in a hole or trench at their roots. If we were to be allowed to plant but one variety, we would select the Dwarf Champion from among the many we have tried, as the best to our taste.

There are many other vegetables and varieties we have tested, but few farmers will care to try even those already named.

As to profit, that must be looked for in the pleasure of eating all the year round nice, fresh vegetables, grown at home, and if more attention was paid to the vegetable garden in northwestern Kansas, and not quite so much wheat and corn raised, the elevators all over the West would not be glutted with grain, and the farmer compelled to haul it home from market at times. The health of the family would be much better, and life more enjoyable, from the work in the garden.

As to market gardening, generally speaking, and from the many failures that have come under our own personal observation, we would say, let it alone, entirely, unless you want to work awful hard for a small margin of profit.

In the preparation of the garden plat, we would advise the use of plenty of well-rotted manure, plowed in deep in the fall, and a top dressing harrowed or plowed under in the spring. Many have condemned the use of manure in this section of the state, saying that the virgin soil was already fertile enough, and that the manure would cause the crop to burn in dry weather. While the soil is as rich as any we have ever seen, we have found manure to be of great benefit, and if well-rotted manure is used the soil will retain the moisture longer than that which has not received any manure. No land was ever injured by judicious use of fertilizers, we care not how rich it might have been.

Irrigation is destined, some time, to play an important part in the agricultural productions of this part of Kansas, and more especially with the orchard, garden, and small farm. We say so because our experience has convinced us of this fact. It will pay. A windmill, a spring, a running stream, or a reservoir in some ravine that will hold back the rains that fall, will furnish the water to irrigate several acres, and the yield of products will greatly exceed that of many additional acres without irrigation, speaking more particularly of the garden, at least.

A simple, economical method adopted on our farm was to build a dam across the creek, which affords water the year 'round, and by that means we raised the water in the pond nearly to a level with the surface of the land on either side. The soil is thoroughly irrigated by seepage, percolation and capillary attraction for a considerable distance on either side. The height of the water in the pond is regulated by head gates and a flume built into the dam. This method is used by several farmers

in Decatur county, along the Sappa and Prairie Dog creeks, and to them a failure never comes. The crops are usually immense. Much of this land is cropped with potatoes, cabbage, onions, etc., of the garden products, and timothy, alfalfa, oats, corn, etc., of the field crops; and large returns are annually expected from this land that surpasses in fertility the famous valley of the Nile. Fruit trees, orchards and vineyards are being set out on this sub-irrigated land, and great hopes and expectations are raised for the future.

In closing this rambling report, I would say that, from a garden or horticultural standpoint, the northwest is not without hope. In fact, we believe it is destined, in the near future, to produce some of the best gardens and orchards in sunny Kansas.

### VEGETABLE GARDENING IN CENTRAL KANSAS.

BY L. W. ANGUS, OF LEWIS.

Gardening on the "Great Plains" is much the same as it is elsewhere, yet modified by some conditions of climate which do not obtain to so great a degree in most other places, and by the multitudes of insect pests which attack almost every plant which we care to cultivate, and seem envious of the short span of life allowed it. The persistent drought which usually visits us each summer, from the first of July to the middle of September, is, perhaps, the greatest drawback to successful gardening, as it enfeebles, if it does not destroy, plant life. That feebleness invites aggravated insect attacks, to which attacks the plant frequently succumbs. The effect of this drought may be to some extent obviated by deep plowing or spading and thorough culture. Make your garden like an ash heap, and not only is evaporation reduced to its minimum, but the soil is rendered permeable to every particle of moisture, no matter whence obtained. Weeds, which act as so many pumps, and are certain destruction to a garden, are to be destroyed or kept at a safe distance.

The failures which so often attend operations in gardening in middle or western Kansas may in almost every case be traced to a want of care in this one particular; that is, the failure to keep the soil fine and clean.

In order to obtain best results, it is quite necessary to enrich the soil. We hear much of the inexhaustible fertility of Kansas soil. This is a very pleasant fiction, yet it is only fiction, and will never do to garden by. The soil of western Kansas is not only subject to exhaustion, but is, more especially in the sandy portions, now being exhausted at a very rapid rate, and even the newest and best soil is frequently lacking in some of the necessary constituents essential to the most vigorous plant life.

Many persons in our droughty country have thought that irrigation was the great panacea for all the ills of a garden's life, and, relying solely on this truly great aid, have miserably failed. I had much rather trust good care with no irrigation than good irrigation and poor care, or no care at all. While on the subject of irrigation, I remark that it is surprising that so few irrigate, when water is so plenty and so easily obtained. To those who have wind pumps, it is simply a question of a few feet of hose, and the fractional moments required to move the nozzle from place to place, so that all parts may be wet alike, thoroughly drenching the soil each week, if that be possible, meantime keeping the soil fine and free from weeds. But irrigation is not of necessity confined to those who have windmills. Even the boy with his little 10-foot-square garden may irrigate with little trouble. One barrel of water on each 100 square feet is equivalent to a shower of rain half an inch in depth. This would many times tide the drooping plants over to the next rain, with a vigor unimpaired, and able to take advantage of every precious drop.

In addition to our care that our land is thoroughly plowed, enriched, and kept

clean, we must consider as to what we will plant, how we will plant it, and how obtain the seed.

Of the usual garden plants, we may, with few exceptions, enjoy them all; and it seems to me that on the limitless prairie we have no occasion to limit our varieties for fear that we shall crowd our garden.

An asparagus bed should be our first care. Having once planted good, thrifty plants of Conover's Colossal, or even seedlings from our neighbor's nameless patch, in hills four feet apart each way, we have only to top dress and keep clean. Nature does the rest. The saline constituent in our soil is very favorable to asparagus, and never in any other place have I seen the plant so successful.

No farmer would omit early potatoes and sweet corn from his list of garden vegetables, and with these variety has little to do. All are successful. The only point of remark is, that they should go into the ground just as soon as in their respective conditions may be safe.

Of sweet potatoes, the plants of which must be started in a hotbed and moved to the ridges only after settled warm weather, Nansemond, perhaps, is best in flavor, but Yellow Jersey is almost as good, much more productive, and of better shape. The red ones are usually insipid and watery, and a yam in this country is a disgrace to a garden.

The Golden Wax bean we must give a place as one of the earliest and most excellent of beans, but any wax or Valentine bean will surely be a satisfactory crop, and the Bush Lima is fast becoming a necessity of life. It is as sure as sand burs, and wondrously prolific. A few days ago I gathered 69 well-filled pods from a single plant. One objectionable feature they have, they ripen during the whole fall, and must be picked successively, as they pop soon after ripening. They should be planted late, as July's sun is sure to blast the early blossom.

Of peas, all are successful, and the varieties are so numerous that it is only necessary for me to say that the bush varieties of wrinkled peas have served me best, Climax best of all.

The summer crookneck is the favorite summer squash, though scallops are fine, and the old reliable Hubbard has never been removed from its head place for winter use. The squash bug is, to us, an unmitigated nuisance, and to him who would enjoy squashes in the garden, it is necessary to sit up all night and get up early in the morning. But they can be beaten. The kerosene emulsion, used in very weak proportions, will save your vines, though it is sometimes easier to plant your Essex, Marblehead or Hubbard on newly-turned sod, where they will usually be successful.

A few hills of Long Green cucumbers, planted quite early, will furnish all that will be required for table use, fresh; but for pickles, White Spine or Green Cluster, planted in June, are best. Gherkins are excellent for pickles, and being much surer and more prolific than cucumbers, should not be omitted; and martynia (unicorn plant), which we consider a noxious weed, is one of the best of plants for pickles. We do not need to cultivate it. Few who have raised corn have failed to properly curse the weed — "devil's claw" — and it is abundant around all old corrals and fields.

Watermelons are considered more as a field crop, and are in such endless variety that each may and must choose the one best suited to his purpose. They should be planted when the weather is thoroughly warm.

Muskmelons are not an entire success. The nutmeg varieties are the best in flavor, while the Banana and Cassaba are the surest and most productive.

Lettuce is a most useful plant, and very easily grown, with the one exception that worms are troublesome to some varieties. The Brown Silesia and Curled Simpson are the most free from this pest. Sow seed in fall or winter in central Kansas for earliest, and in succession for later use.

Dewing's Turnip Blood beet is a most excellent vegetable, the best for this climate, though some still adhere to the Long Blood. Either, planted as early as is safe, and cared for as well as we would care for garden plants, will furnish a great amount of good and nutritious food.

Carrots should be planted same as beets. Long Orange will yield an immense main crop, while Chartres or Scarlet Horn will furnish a delicate flavor for many a summer dish.

The Hollow Crown parsnip is one of the most delicious vegetables, but is not sufficiently known in central Kansas to be fully appreciated. Plant same as beets or carrots, in a deep, rich soil, and leave when grown until wanted for use. Freezing improves their flavor. They come in use just as other vegetables are gone, or from long keeping have lost their flavor, and, coming as they do, fresh from the ground, they fill a very important place. While Hollow Crown is best in yield and flavor, in some localities, where there is a hard and obdurate subsoil, it is very troublesome to dig the roots, as they penetrate the subsoil, and will be broken in the ground. In such localities some of the stump varieties would be preferable.

The culture and keeping of salsify is the same as for parsnips, and to those who succeed in growing salsify it furnishes a most delicious article of food, having much the flavor of stewed oysters, from which fact it receives its popular name. The chief enemy that salsify has is a white grub in the crown, which destroys the whole plant by a process of decay. I have found no remedy.

Radishes are so well known that it seems superfluous to mention them. Each person may have his choice. My choice is, for early, French Breakfast in succession, and for general crop, Long Scarlet, with a few White Chinese for winter use.

The Purple Strap-leaf turnip is much used for early sowing, and under favorable circumstances will do well for winter use if planted about the last of July; but Swedes are not only much surer, but of better flavor and more productive.

Onions, as a rule, are not satisfactory. Still, by using sets of Silver Skin or Yellow Danvers, a fair crop of excellent roots may be obtained. A few bunches of winter onions are necessary, as they will be in prime condition to use when the snow goes off, having grown all winter. A few rows of black seed, planted as soon as safe, may produce plants that will give peculiar zest to your bread and June butter.

Eggplant (New York Purple is the best) and peppers (Cayenne for seasoning and Bull Nose or Mountain Sweet for pickles) may be transplanted from the hotbed when the weather is suitably warm. They require considerable heat as well as moisture, so that partial irrigation at least should be resorted to.

Celery will prove successful only to him who has facilities for an ample supply of water, and it is advised that it be tried only under such circumstances. Thus far no one has grown celery to any degree of success in central Kansas.

The saline element in our soil makes the growing of cabbage a success in most seasons, especially if well watered during the dry part of the summer. I find it safer to plant seed in hills where it is to grow, thus avoiding transplanting in a dry time. The varieties are numerous, so that much latitude may be used in choosing, although it is safer to use Drumhead or Flat Dutch for general winter crop.

Rhubarb, like asparagus, is a perennial, and, after having it once set, you have only to keep it clean and richly fed, as it is a voracious feeder.

While attending more strictly to such vegetables as produce for the common wants of a family, we should not omit a place for the children's pop corn and peanuts. Pop corn, like common field corn, is much affected by worms in the tip of the ears, and in naming Pearl as the best to grow, it is entirely in view of the fact that it is less affected in this way than some other kinds.

The peanuts should be the Small Spanish, the nuts of which grow in a cluster about the taproot, thus making them easy to gather. This variety is very productive, and with no pops or empty shells.

In addition to the usual garden vegetables already mentioned, there are many used for soups, pickles, or seasoning, which may well find a place in our gardens. Among these are dill, thyme, sage, garlic, horse-radish, etc., which grow well, and are much more delicate and reliable than can be bought at the stores.

The directions for planting and cultivating a garden are mostly general, applying to all soils and climates alike, the most obvious cause for difference being in the amount of moisture. Central Kansas being essentially a dry climate, it will be seen that an acre of land will not supply a proper amount of water to as many plants as the same amount of land in a more humid atmosphere would bear. It is well, therefore, to plant thinly, and I find three feet to be none too great a distance between the rows to obtain best results. This distance admits of horse cultivating, which reduces the cost of producing to its minimum. Good seed is a prime necessity in the garden as in the field. There are many reliable seed houses in the country, of any of whom good, true seed may be procured. But by far the best way is, for everyone to grow for himself such seed as he may want. By this means you have good, new seed, which will be pure and true, and, above all, thoroughly acclimated. It is three years since I bought a packet of seed, and in the same time the products of my garden have increased at least 300 per cent., all of which, I believe, may be attributed to my good, new seed.

#### VEGETABLE GARDENING IN SOUTHWEST KANSAS.

COMMITTEE REPORT BY J. F. SHANNON, OF KIOWA.

*To the State Horticultural Society :*

Your committee would report that no opportunities have been open to him to investigate market gardening in this section, and that this report can contain little except his own experience in private, amateur work.

The past season was very unfavorable to gardening operations. Very mild and favorable weather in the latter part of February and early part of March was followed, about the middle to 25th of March, with rain, storms, and cold, followed by a dry and backward April, a cold, wet period in May, rather favorable in June, but very dry in July and August. Cold in the spring delayed germination and killed sprouted plants. Heavy rains, in some instances, so packed the ground that tender seedlings could not get through, and throughout the season high winds were a great damage to many growing vegetables.

*Lettuce.*—Kinds sown: Henderson's New York Head, Early Whitehead Perpignau, Paris White Cos, and a light-green, curled variety, name unknown. Henderson made large heads, dark green, crisp, tender, and of good quality. Perpignau gave smaller heads, creamy color, but slightly bitter in taste; goes to seed early, and not a very valuable sort for family use. Paris White Cos made fine heads, white, exceedingly brittle and tender leaves, after being tied together to blanch for a week or 10 days, with a very delicate flavor; a sort that should become very popular for family use. The curled sort grows rapidly, made loose, fluffy heads larger than a peck measure, and stands long without going to seed; it is every way a favorite sort for forcing and family use. All of these were injured by winds—the Cos sort most, as the top is heavy and erect and the crown weak.

*Onions.*—Yellow Globe Danvers and Prizetaker made fine bulbs from seed, many of them having the diameter of an ordinary pint cup. Sown in February and March, they ripen in August.

**Beans.**—A long, green, snap sort, Improved Early Red Valentine, and Henderson's Bush Lima. The long green, name unknown, is the best in quality, very productive, and earlier than Valentine, though hardly so productive. The Bush Lima did not do well, though with a more favorable season it is believed that satisfactory results could be achieved with it.

**Beets.**—Early Eclipse made splendid roots, though delayed by the backward spring.

**Peas.**—Henderson's First of All, American Wonder, Strategem, and Heroine. First of All is early and productive, but differing very little in these characteristics from the American Wonder, and not nearly so good in quality. Strategem proved a valuable later sort, and Heroine seemed a poor sort.

**Radishes.**—Long Scarlet, Short-Top, Long White Vienna, Chartier, French Breakfast and Rapid Forcing were tried. The best for family use were the French Breakfast and Chartier. The first grows quickly, and makes delicious, crisp bottoms; the second yields crisp, large, mild-flavored bottoms, which stand longer than any other sort without becoming pithy. Both are beautiful in appearance. Rapid Forcing proved worthless. The Gray Long Winter, sown in September, made very firm bottoms, about eight inches long; are rather strong flavored, which freezing may correct.

**Cucumbers.**—Nichol's Medium Green was the only variety tried. It did not do well, on account of drought in July and August. Seed did not germinate well, but the variety was not satisfactory, and will not try it again.

**Potatoes.**—Early Ohio seems to do best, but gave a poor crop this year.

**Tomatoes.**—Ponderosa, Dwarf Champion, Table Queen, and Yellow Plum. Dwarf Champion was most productive, and a very fine sort; medium size, smooth, and beautiful color. Ponderosa is large, but rather rough; does not color well, but will be tried again. Table Queen was worthless. Yellow Plum set lots of fruit, but did not ripen well. No sort produced satisfactorily this season.

**Sweet Corn.**—Stowell and Country Gentleman. Poor crop; largely owing to the fact that poultry was permitted to run where it was planted, which delayed maturity for nearly a month, as the hens bit off the young corn. Both are fine varieties, but no material difference in earliness was observed.

**Parsnips** planted in March made a poor stand, but some good roots formed. Those planted in May did not do well. Last year, the Hollow Crown grew specimens over two feet long.

**Okra.**—This is a fine vegetable for family use, and should be in every private garden. A couple of dozen plants afforded a supply that was more than abundant from the 10th of July to nearly the end of October. It is delicious and nutritive, though a liking for it must, generally, be acquired. It is seasonable at a time when other vegetables are scarce, and affords a very acceptable variety for the table in August and September. It is of the very easiest cultivation, and the past season proves its ability to endure hot winds and drought. Your committee would cordially recommend it for every family garden.

**Melons** were grown to some extent in this section, but your committee failed completely. He will return to the method of deep hills, well enriched with rotted stable manure, which gave abundant crops the year previous.

**Celery** failed again. Without partially shading the young plants, and some method of irrigation, it does not seem that any satisfactory measure of success can be obtained.

Cabbage, spinach, turnips, carrots and squash were not tried.

Cauliflower was sown, but no success worth mentioning was had. Further experiments will be made.

## PLANTING AND CULTIVATION.

Ground prepared by deep plowing or spading in the fall, well enriched, gave best results.

Lettuce sown in hotbeds in February, and in drills in open ground in March, thinned gradually to one foot apart and cultivated often but not deep, and kept clean of weeds, did quite well.

Onions, under the "new culture" system, sown in hotbed in February and March, and transplanted to the garden in April and May, cultivated shallow until in June, and mulched, did well. A row 36 feet long yielded about three pecks.

Peas and beans planted rather deep, and cultivated, succeed. Deep planting is necessary for our sandy soil, which dries out quickly on the surface.

Tomatoes started in hotbed in March, transplanted to pots, hardened in a cold frame, and set deep, made the best growth. When set in clumps rather thickly, about two feet apart each way, they were the most productive. This was probably owing to the shading of the ground by their tops and the checking of their growth. But further experiments are necessary to determine the best methods and varieties for this locality.

Your committee is not aware of any good crops of tomatoes being grown in this section by any method, of any variety, or in any season.

In conclusion, allow me to add, that with conscientious effort, though many failures may be met with, a reasonable degree of success in growing vegetables for family use may be secured in almost any season. This observation is based upon the experience of seven years in this part of Kansas.

## REMARKS ON REPORTS.

MAJOR HOLSINGER: I cannot see any necessity for using salt on an asparagus bed. After having thoroughly plowed the land, open ditches with a plow and set the plants on the bottom, and cover with a hoe. Cultivate towards the plants during the season until the ditch is filled up, then add about four inches of stable manure to the rows, and success is secured. Cultivate the ground each year thereafter, and, if needed, add manure. I believe culture and manure are better than any amount of salt. With a good market, \$300 per acre can be relied upon.

GEO. W. BAILEY, Wellington: I have found salt a great help.

H. A. JENNINGS, Winfield: Salt and stable manure are needed for asparagus.

H. A. JENNINGS and W. J. KENNEDY, Winfield, had raised nice celery by starting the seed in a hotbed, and, when planted out, irrigated by means of a windmill. In bleaching the stalks, both banking up onto the plant and setting up boards on each side of the rows had been successful.

The President read the following telegram from the Illinois Horticultural Society:

To G. C. Brackett, Secretary:

CHAMPAIGN, ILL., December 8, 1892.

Accept greetings, with kindest regards of the Illinois State Horticultural Society.

A. C. HAMMOND, Secretary.

[REPLY.]

To A. C. Hammond, Secretary, Champaign, Ill.:

WINFIELD, KAS., December 8, 1892.

Greetings. Sincere wishes for the success of your meeting.

KANSAS STATE HORTICULTURAL SOCIETY.

Then followed the report of the Committee on

## EXPERIMENTAL HORTICULTURE.

BY PROF. S. C. MASON, STATE AGRICULTURAL COLLEGE, MANHATTAN.

The site of our experiment station vineyard is a typical piece of upland of the carboniferous region of eastern Kansas.

It lies at a slight elevation above the bottom land, with a moderate slope to the

east, and has a slight outcrop of limestone above it. The soil is a good quality of clay loam, with a stiff clay subsoil—not the cold, blue, bowlder clay of many sections of the East, but the brown, waxy clay which underlies the soil of so much of our Kansas prairie, becoming, when thoroughly wet, almost a gumbo in adhesiveness, and, when thoroughly dry, shrinking and cracking into little cubes that a spade can hardly penetrate.

For a number of years previous to planting the vineyard, the tract was occupied as an arboretum, but, after cleaning, was plowed and subsoiled to the depth of a foot, and put in thoroughly fine condition. The rows were set seven feet apart, running north and south; the vines, nine feet in the rows, only two vines of each variety being planted.

In the spring of 1888, the first planting, of 64 varieties, was made, and the list has been increased each year, till we now have 150 varieties, including several wild species for comparison.

One of the first considerations in studying the behavior of these vines has been their hardiness. A Kansas winter is liable to present some trying variations of temperature, although we seldom have the severe cold common in more northern states. Our lowest record for a good many years was that of 27 degrees below zero, last winter; but a warm December, with Japan quince and Bridal Wreath spiraea nearly ready to burst into bloom, may be followed by a week of cold, from 10 to 20 degrees below zero.

Our lack of snow in an average winter, and the drifting that usually follows when a heavy fall does come, deprives the vines of protection from that source.

It will be clear from this, that sorts of grapes which endure and bear fruit regularly after a succession of such winters may pretty safely be counted as hardy. Sorts which have shown any tendency to winterkilling have been carefully noted, and, in a large number of cases, protection given to one vine and the other left exposed, with the idea of determining clearly whether the sort might not prove sufficiently hardy to fruit in this country if given such simple and cheap protection through the winter as would be within the means of the grower, without encroaching too closely on his margin of profit.

Of 100 varieties which have been two or more years in fruit, the list which have proved entirely hardy includes the following, which I have arranged according to their specific origin as nearly as possible:

Those of pure *Vitis Labrusca* blood are Cambridge, Champion, Concord, Cottage, Dracut Amber, Early Victor, Eaton, Eva, Francis B. Hayes, Green Mountain, Hartford, Ives, Lady, Martha, Mason's Seedling, Moore's Early, Perkins, Pocklington, Potter's Sweet, Telegraph, Vergennes, Whitehall, White's Northern Muscat, Worden's Seedling, Woodruff Red, Wyoming Red, and, if we regard Moyer as a pure *Labrusca*, that should be included here.

Those of *riparia* blood, or *riparia* and *Labrusca* hybrids, are Amber, Bacchus, Clinton, Elvira, Faith, Green's Golden, Humboldt, Marion, Missouri Riesling, Montiflore, Pearl, and Rommel's Etta.

The hardy list also contains the following sorts from Mr. Munson, which are given with the parentage as furnished by him: Beagle + Elvira, Black Eagle. Bell + Elvira, Delaware. Blanco + Elvira, Delaware. Conelva + Concord, Elvira. Early Market + Elvira, Triumph. Gold Coin + Cynthiana, Martha. President Lyon + Elvira, Lindley.

Whether Delaware is a hybrid, containing a trace of *vinifera* blood, is likely to remain an unsettled question, but its place is in the hardy list, and with it Beauty, said to be a seedling of Delaware and Maxatawny.

These two, with the three of Mr. Munson's, containing a fourth of *vinifera* blood,



and his two Delaware crosses, making seven in all, are the only ones of the hardy list that contain any trace of the foreign blood.

With a class of vines that we had reason to regard as more or less tender, we have proceeded as follows: The vines are pruned before hard freezing weather comes on, in such a way that the canes may be bent to the ground without injury; then one vine of each pair is covered with a little straw and about six inches of earth thrown over it, while the canes of the other are simply caught to the lower wire of the trellis, for safety.

Following is a list of sorts so treated last winter, in which the covered vine came out in good condition and bore a fair to heavy crop of fruit; while the vine not protected was either killed to the ground or so badly damaged as to bear but a few clusters.

Of *V. æstivalis* or other southern types, we have Cynthiana, Eumelan, Herbemont, and Lenoir. Of *Labrusca* origin, but believed by some to contain a trace of foreign blood, we have Isabella and its seedling, Prentiss, Maxatawney, Catawba, with its seedlings, Iona and Diana, and Mr. Munson's supposed Catawba seedling, Dinkel; Niagara, pure *Labrusca*, is also included here. Of hybrids of various blood, but all containing more or less of the *vinifera*, we have Agawam, Amber Queen, Aminia, August Giant, Barry, Black Eagle, Brant, Brighton, Brilliant, Centennial, Creveling, Croton, Downing, Duchess, Eldorado, Goethe, Gazelle, Herbert, Highland, Irving, Jefferson, Jessica, Lady Washington, Lindley, Massasoit, Merrimac, Mills, Naomi, Norfolk, Peter Wylie, Poughkeepsie Red, Red Eagle, Triumph, Ulster Prolific, and Wilder. Empire State, *V. Labrusca* x *V. riparia*, is the one tender variety of that class.

Three sorts, which had previously been hardy and were not put down, suffered quite severely this time, and should be included in the tender list. They were Moore's Diamond, Norton's Virginia, and Vergennes.

Summing up the hardy sorts, we find 49, of which 27 are of *Labrusca* blood, 14 *riparia*, or *riparia* and *Labrusca* hybrids, and one hybrid of *æstivalis* and *Labrusca*, making 41 native sorts. Three more have but a fourth of *vinifera* blood, and four, the Delaware family, are doubtful.

In a like manner, summing up the varieties that require protection, we find 51. Five of these are of *æstivalis* blood, natives of the South, unless we accept Mr. Munson's species, *V. Bourguiniana*, which he supposes to be of European origin, for the source of Lenoir and Herbemont. Seven of them, including Catawba, with its seedlings, Diana, Dinkel, and Iona, Isabella, with Prentiss and Maxatawney, have been claimed as native grapes, but the character and flavor of the fruit, especially of Iona, from Catawba, and Prentiss, from Isabella, leads me to agree with those who believe them to possess a trace of *vinifera* blood. One, Niagara, is of pure *Labrusca* blood; the remaining 39 are undoubted *vinifera* hybrids; and Downing, Highland, and Mills, if correctly reported, have three-fourths of that blood. The conclusion from these records is unquestionable, that for varieties of grape which will endure without protection all of our Kansas winters, we must look to the *Labrusca* and *riparia* families in the main.

Another conclusion which will be drawn from a study of these lists is, that while the hardy list furnishes the greater part of the grapes which reach the market, and also a large share of the fruit consumed at home, the list of tender sorts includes by far the greater number of grapes of fine quality. To be sure, the Delaware is found in the hardy list, and is good enough for any table. Few would be disposed to complain of lack of choice grapes with plenty of this at hand, but in Kansas it is a shy bearer, and is seldom on the market.

Those who would enjoy a home supply of something better than the Hartford,

Ives, Concord or Martha furnish, or have a market near for choice fruit carefully selected and packed, may well try a few rows of these more tender vines enumerated, and test for themselves whether the work of protection will not be well repaid in the increased enjoyment afforded the family, or in the better sizes and surer market always assured to a superior product when it becomes known.

### SPRAYING WITH INSECTICIDES.

BY DR. A. NEWMAN, OF LAWRENCE.

The thought of meeting and overcoming the depredations of insects upon our fruits, by spraying our fruit trees with the arsenites, is of quite recent origin. It is hardly more than five years since it was first suggested and put in operation. Within this short period the practice of spraying fruit trees and grapevines has spread with remarkable rapidity. The breadth and extent of its adoption, I think, demonstrate two things: First, the great extent and damage of insect depredations upon our fruit; and, second, the efficiency of spraying with insecticides as a means of prevention. It is interesting to see how, in every department of human activity, the presence of a great need leads to the discovery of the proper remedy. It seems as though nature held in store a remedy for every ill—a supply for every need; and that it is only when our need presses hard upon us that we delve with sufficient energy to develop the remedy. So that, however great the difficulties which beset our pathway and threaten our success, we ought not to be discouraged; but we ought rather to apply ourselves with energy and courage to finding a way out of our difficulties.

The intelligent application of spraying requires an accurate and intimate knowledge of the habits of our insect enemies. Without this knowledge we can, at best, apply our knowledge only in an empirical way. We cannot too clearly recognize our obligations to those who, by patient and well-directed observation, have placed such knowledge within our reach. This knowledge enables us to apply our remedy scientifically and rationally. We know what we may expect to accomplish by them and what we may not. It is not every insect enemy of the horticulturist that spraying will defeat. While it furnishes an excellent and reliable protection against the ravages of many which have been injuring our fruit to a serious and yearly increasing extent, it is not adapted, and cannot in the nature of things be expected to prevent, the ravages of others equally damaging, but whose habits exclude them from its proper application. As an example of the last-named class, I will name the Apple Maggot (*Trypeta pomonella*), which has done considerable damage in my orchard for the last three years. Not attacking the fruit until it has attained considerable size, spraying as a remedy is impracticable. As a general rule, we may, I think, count on spraying with arsenites as an effective preventive of damage from insects which feed upon the foliage and buds of fruit trees, or upon the fruit itself in its nascent state. And this, it seems to me, must be the limit of rational expectancy.

In respect to methods and results, I am sorry that I cannot speak from a larger personal experience than I have. I sprayed my orchard first in the spring of 1891, using London purple, one pound to 100 gallons of water. I sprayed but once, and that soon after the blossom leaves dropped. My fruit that year was damaged less by insects than it was the year before. But a new enemy appeared—the apple scab—upon several varieties of apples, but damaged the Missouri Pippin and Winesap most; so that on last spring I determined to spray for that also. For this purpose I sprayed, before the blossoms opened, with carbonate of copper, using carbonate of ammonia as a solvent, and using three ounces of the carbonate of copper to 50 gallons of water. Again, after the blossom leaves dropped, I sprayed with the same, adding to each 100 gallons one pound of London, purple. My orchard blossomed

very full, with the exception of one variety—the Northern Spy—and I anticipated a full crop of apples. On visiting my orchard a few days after the spraying last named, I found the leaves presenting a brown and blighted appearance. My first impression was that the spraying had scorched the leaves. I soon found, however, that some trees which had not been sprayed at all were quite as badly affected as any, and I was forced to look for another cause. Further observation convinced me that the affection of the foliage was due to the apple-scab fungus. My Missouri Pippins and Winesaps were most affected, and on these varieties, although they blossomed full, almost no fruit set. The Ben Davis trees dropped most of their fruit early. Hubbardston, Fall Orange, Fameuse, Red Astrachan and Early Harvest bore a medium crop. It seemed to me that there was a close relation between the affection of the foliage and the failure of the fruit to develop. I intended to spray again, but the slight prospect for fruit discouraged me.

My crop this year was too light to furnish data upon which to estimate results. But I believe that our estimate of the value and importance of spraying will every year grow larger. In estimating results, we should consider that in many cases the apparatus used for applying the spray has been quite imperfect, and but ill adapted to secure the best results. We may, I think, reasonably look for such improvement in our apparatus as will largely increase its efficiency. The inventive genius of Americans may be depended upon to bring these to approximate perfection.

### SPRAYING WITH INSECTICIDES.

BY JAMES KANE, OF LAWRENCE.

The past season was very unfavorable for spraying, winds preventing the work being done at the proper time, and rains washing the poison off before it had the desired effect. With favorable weather, results would have been different.

Plum, apricot and cherry trees were sprayed three times:

(1) April 8, before buds started. Had a heavy rainfall on the second day after this spraying.

(2) May 19. For first and second spraying, used 1 pound London purple to 200 gallons of water; 6 pounds copper sulphite, 4 pounds lime, to 40 gallons of water.

(3) June 7. For third spraying, used 1 pound Paris green to 200 gallons of water, with Bordeaux mixture.

Result.—Fruit wormy; stung by Curculio. Wild Goose plum set two-thirds of a crop, nearly all dropped; Lombard, Green Gage and Imperial Gage all rotted; Miner set a full crop, and matured two-thirds, of fine, large fruit, free from worms; apricots set a half crop, all rotted; cherries, wormy and knotty; two plum trees, sprayed six times—three with Bordeaux mixture, three with carbonate of copper and carbonate of ammonia, to check fungus growth—fruit all rotted.

Apple trees were sprayed twice:

(1) May 23. Used 1 pound London purple to 100 gallons of water.

(2) June 7. Used 1 pound Paris green to 200 gallons of water. Bordeaux mixture was used with each spraying.

Result.—Apples, wormy and scabby. The Canker Worm appeared in my orchard three years ago. Sprayed heavily with London purple. Did not see any last year nor this year. Leaf Roller was plentiful; they have almost disappeared.

Vineyard was sprayed six times:

(1) May 11. Buds had started; made growth of about an inch. Used 12 pounds copper sulphite, 16 pounds lime, to 70 gallons of water. Had a heavy rainfall on the second day after this spraying.

(2) May 25. Used 6 pounds copper sulphite, 4 pounds lime, to 40 gallons of water.

(3) June 7, as grapes came into bloom. In each of these three sprayings, three tablespoonfuls of Paris green were added to each barrel of liquid, as an insecticide.

(4) June 25. Eleven days after blooming, sprayed with 5 ounces carbonate of copper, 2 pounds carbonate of ammonia.

(5) July 7. Used 5 ounces copper carbonate dissolved in 2 gallons of aqua ammonia; strength, 22.

(6) As fruit began to color, sprayed with 5 ounces copper carbonate, 2 pounds ammonia carbonate.

Carbonate of ammonia is a better solvent of copper than aqua ammonia. When aqua ammonia is used, care should be taken not to apply it too strong, as it is liable to burn the leaves or speck the fruit. We used it in sprayings this year, and got it too strong. The fruit was badly specked. Remained on till fruit was gathered.

Result.—Black rot appeared on foliage June 15. It usually makes its appearance on the foliage about a week or 10 days before seen on the fruit. It appeared first on the fruit this year June 23. Weather was murky and warm, with heavy dews. Anthracnose appeared on a few vines, but did not spread. No mildew. Ives Seedling and Dracut Amber, scarcely any rot. Niagara, Pocklington, and Hayes, about 10 to 15 per cent. rot. Worden, Concord, and Catawba, about 30 per cent. Some vines, scarcely any rot; others from one-half to two-thirds rotted. Grape-berry Moth, Gall Louse and Steel-winged Beetle have been very plentiful in my vineyard for a number of years. Spraying has lessened them, so that this year I have not seen the effects of a louse or beetle; a few moths, but the damage done was very light compared with other seasons. If I can control these insect enemies, I will be fully repaid for all cost and labor of spraying.

The following vineyards were visited, and notes taken: William Plasket sprayed three times with Bordeaux mixture. First time, April 21, before the buds started. Second and third times, later, and two weeks apart. Result, 25 to 30 per cent. black rot.

C. W. Roberts sprayed three times, using 6 pounds copper sulphite, 4 pounds lime, in 45 to 50 gallons of water. Result, 10 to 15 per cent. black rot.

Vineyards not sprayed, in which there was very little black rot: W. H. Duncan, P. Albach, P. P. Phillips, and M. Spencer.

The following I did not visit, but were reported by letter: J. A. Pearson, Vinland, Kas., sprayed five times. First, April 10; second, about 10 days before blooming; third, when in bloom; fourth, about three weeks later; fifth, 1st of August. Mixtures used at each spraying: 16 pounds copper sulphite, 30 pounds lime, to 28 gallons of water. For the other four sprayings, used 6 pounds copper sulphite, 4 pounds lime, to 22 gallons of water. Amount of copper sulphite used at each spraying: First, 50 pounds; second and third, 30 pounds at each spraying; fourth, 40 pounds; fifth, 20 pounds.

Mr. Pearson says he would not spray so heavily again with Bordeaux mixture after the third spraying. Fruit was badly specked, and berries that had most of the mixture on burned. Spots remained on fruit; rains did not wash them off. There are about 1½ acres in the vineyard; is on a sandy hill, sloped to the south. Fruit sold, two tons, besides what was used by his family. Last year his grapes all rotted, and had to buy to can for family use. One row in the middle of the vineyard was not sprayed, and not a single bunch was picked from this row; they rotted almost to a berry. One hundred and seventy-five pounds of grapes were picked from the row next to the one not sprayed.

George E. Young's vineyard of 2½ acres: For four or five years the fruit rotted badly, and last year it all rotted. Commenced spraying, as soon as blossoms fell, with Bordeaux mixture, at intervals of about three weeks, for the first three spray-

ings. Twice with ammoniated carbonate of copper, about a week apart. Finished spraying about two weeks before the grapes began to color. Result, grapes did not rot any. Mr. Young is not certain whether spraying is to receive full credit or not for the exemption from rot.

The nozzle is of great importance in distributing the liquid evenly over the entire surface of the plant. We have used several patterns, but none of them did the work as we think it should be done. This year we used the Wellhouse pattern, cutting the slot much smaller than is used for spraying trees, and it did very good work with ammoniated mixtures, but had trouble with Bordeaux from clogging. The kind of nozzle we need is one that will scatter a fine spray evenly over the entire surface of the vine. Vines should be trained and pruned so that the spray will reach every part of them.

Copper carbonate can be easily made. Material did not cost us, this year, to exceed 15 cents a pound, which is less than half what the druggists ask for it.

Cost of spraying one acre six times:

Three sprayings with Bordeaux mixture.....	\$1 80
Three sprayings with ammoniated carbonate of copper.....	1 45
Preparing the material and applying to the vines.....	7 75
Total cost.....	\$11 00

#### DISCUSSION OF THE REPORTS.

F. WELLHOUSE, Fairmount: As to nozzles, Prof. D. Fairchild, of the agricultural department, at Washington, after a careful testing of our nozzle, pronounced it the best for horse-power spraying machines. Blight has not attacked our Jonathan apple trees since we began to spray them; and, while I am not sure, I am somewhat inclined to think the treatment has been a protection against the disease.

Discussion closed.

The Committee on Obituary announced the death of Dr. J. L. Williams, and offered the following:

*Resolved*, That in the death of Dr. J. L. Williams, who for many years was secretary of the Jackson County Horticultural Society, and one of the valued members of this Society, we lose an energetic worker, who was ever ready to aid in promoting horticulture in the state.

On motion, the resolution was adopted.

#### AFTERNOON SESSION.

THURSDAY, December 8, 1892.

The meeting was called to order by President Houk, who announced the following reports on

#### FORESTRY.

BY NIC. MAYRATH, OF DODGE CITY.

I have been growing forest trees in southwestern Kansas during the last 14 years successfully. It has paid me well in money, as well as in the advantages of groves and shelter belts on my farm, which now cover about 34 acres.

I have 29 varieties. Some of these are worthless, especially when planted on upland. Others are fairly to very good. On bottom land, the Lombardy poplar and cottonwood make a fine growth for the first 5 to 10 years. Then a borer kills the cottonwood, and a woolly caterpillar denudes the poplar of its leaves, and conse-

quently kills the trees. My experience teaches me that, in order to have trees to grow well in western Kansas, the ground should be plowed very deep—the deeper the better—and well pulverized. I believe our lawmakers were wrong in compelling owners of tree claims to plant trees the third year after entry, as it is almost impossible to get sod ground in good cultivation in two years.

For timber claims, I would plant eight by eight feet each way, using seedling trees. Plant, as sure growing, the following, in the order named: Black locust, honey locust, Osage orange, ailantus, white ash, black walnut, catalpa, box elder, soft maple, elm, sycamore.

For wind-breaks or shelter belts, I plant four feet by eight, and thin out as needed. Here is where the Russian mulberry will come in good play, as this is one of the best trees we have for wind-breaks. Osage orange comes next. Any of the trees recommended for timber claims will do for shelter belts. A row or two of Lombardy poplars or cottonwoods will, by their tall and rapid growth, help to make the more slower-growing sorts take a straight, upward shoot.

For groves, if the desire is to have different varieties, the best plan is to have the tall-growing sorts at the north end, and follow this up with smaller sorts, until the south end of the grove is reached.

As to cultivation, after planting, in order to get a thrifty growth and to get straight trees, it is of the utmost importance that trees should be given fully as much cultivation as corn should have, and particularly more so in western Kansas, as the rainfall is not so large as in other parts of the state.

Farmers, generally, do not cultivate their young trees enough, as long as other field work demands their attention, and, when done too late, it does more harm than good, as it prevents trees from ripening their wood, and they are liable to winterkill. I never cultivate trees after July 15. There is some opposition to the Russian mulberry on account of its low-growing habit, but I find that there are five to six different sorts of these trees; and that some of these trees will not grow upright by any means, while others will grow up straight, and with very little trimming. These last also have the largest and best fruit. I made quite good-looking trees out of Russian mulberry by cutting them off even with the ground when two years old, and allowing only one sprout to grow up. For some years I have planted cuttings taken from trees that bore good fruit, and also made nice straight trees of them. From 70 to 90 per cent. of the cuttings will grow if made during winter and buried in sand and planted in the spring. This way I get Russian mulberries that are desirable for their fruit as well as forest and shade trees. The catalpa, also, will grow low and scrubby for a year or two in western Kansas. It also can be made to grow upright by cutting the tree off near the ground when two years old or even older, and allowing only one sprout to grow. In planting seedling forest trees, I mark off the land one way with any kind of a marker, then, with plow and team, run a furrow the other way, turn around and follow the same furrow back again. This gives a deep furrow, with plenty of fresh dirt to plant in on both sides of the furrow. A man with a spade, and a boy with the trees, should plant 5,000 trees in a day, and plant them well. I would not advise to open up furrows faster than needed by the planter, or the soil will dry out before planted.

For early firewood on the western plains, there is no tree better adapted than the ailantus, sometimes called "Tree of Heaven" or "Paradise Tree." This tree is as easily raised from seed as cabbage. It can be raised from pieces of roots, like horse-radish is propagated. I would advise every farmer on our "Treeless Plains" to plant from three to five acres; plant 4x8 feet; cultivate well until two or three years old; then cut down even with the ground in fall for firewood. The stump will throw out sprouts in spring following, and, if cultivated, these will make a

growth 6 to 12 feet high by fall. These can again be cut down in the fall for firewood. This can be kept up as long as firewood is needed at very little expense, and will be a saving of many a dollar for coal or other fuel. My advice to all western farmers is to plant trees around the homes. Plant good varieties if possible; if not, then plant anyway, even if you know that they will die in 5 or 10 years, as dead trees make good fuel, and the planting will not be an entire loss.

The commissioner of forestry at this station, Mr. G. V. Bartlett, claims that there are only three things necessary to be successful in tree raising, and I fully agree with him. These are: First, work; second, more work, and third, still more work.

By planting my trees eight feet apart one way, I save a good deal of plowing and cultivating, by making use of a disc harrow and an Acme harrow. The latter is particularly good, if used frequently and while the weeds are small.

Trimming of forest trees should be done during winter, as the farmers then have more spare time than in the summer.

### FORESTRY.

BY E. T. DANIELS, OF KIOWA.

Here in south-central Kansas (Barber county) there is very little forest-tree planting done, and that is chiefly of cottonwoods. When we view these treeless, wind-swept prairies, and think of the many and great benefits accruing from a judicious planting and culture of forest trees, it seems surprising that farmers do not plant more. When asked about it, they say "It costs so much," or, "It takes so long." As to the time involved, the time goes on anyway, whether we plant or not, and the sooner one plants the sooner he will gain the rewards. As to the expense, it need not be much in cash outlay. Seeds and cuttings may be had for almost nothing, and good yearling trees, just right for planting, may be had for \$1 or \$2 per thousand.

In the horticultural books and papers of the day there is plenty of good instruction for the beginner. My experience of the past three years may be of interest and use to others, as evidence of what may be done in this region. In the spring of 1890, wishing to add to my plantings of forest trees, I prepared a strip four or five rods wide and 60 rods long, on my highest land (upland prairie), on the north of the orchard and buildings. I plowed the ground one foot deep, and planted yearling trees four feet apart each way, and cultivated thoroughly for two years.

The trees made a splendid growth, and filled the rows so as to prevent further cultivation. Last winter I mulched the grove with straw, and, although the past summer has been very dry, the trees made a good growth. This mulching is not a great job, and pays well. It keeps the weeds down, holds the moisture, and retains the leaves where they fall, thus securing forest conditions at once. All trimmings of the orchard and vineyard are hauled and thrown into the edge of the grove and left there to rot. This seems to me a much better way to deal with rubbish and surplus straw than to burn it.

My groves contain some 15 varieties of trees. At present, the black locust is in the lead. I was told it would "sprout and take the place." Although I have plowed deeply for three years within six feet of a row of them, they have not sprouted yet. Elsewhere I have known them to throw up sprouts, but from some cause they do not seem inclined that way here. They are next to the cottonwood in growth, and equal the Russian mulberry in resisting the drought. The black walnut, ash, ailanthus and Russian mulberry are all doing finely, and seem well adapted to upland planting. No farmer should fail to plant some of the latter. For a quick wind-break they are unrivaled. They furnish shelter to poultry and the quail from the attacks of hawks, and food, also, for some three months, so that the berry patch,

vineyard and cherry trees are unmolested by these feathered friends. The Osage orange is a tree of great value for either upland or valley.

Were I restricted to six varieties of deciduous trees, they would be black walnut, black locust, Osage orange, ailantus, Russian mulberry, and ash—these for upland. For bottom land, cottonwood, mixed with the five last named, the cottonwoods to be removed entirely in time. For growing a wind-break on a small area of land, a single row of red cedar, six or eight feet apart, well cared for, will prove most satisfactory, being both beautiful and effectual, and a lasting adornment to any farm.

In conclusion, let me urge farmers to plant trees. Plant them for the fruits, flowers, and nuts. Plant them for shade and shelter to man and beast. Plant for fuel, posts, and logs. Plant for the dollars and cents in the added value to stock made comfortable. Plant for the sake of your children, that their days may be more joyous, and generations to come will "rise up and call you blessed."

### VINEYARDS.

REPORT OF STANDING COMMITTEE, BY F. W. DIXON, OF NETAWAKA.

*Grapes for 1892.*—The year of 1892 has been a disappointment to the vineyardist as far as a crop is concerned, but prices ruled very high, and he received a fair profit, notwithstanding the gloomy outlook in the spring. The spring was a very wet one, and ruinous to the grape. In this section, if it had not been for a short cessation of rainfall during the blooming period, the crop would have been an entire failure. A heavy rain, when the grape is in full bloom, will knock off the pollen to such an extent as to destroy at least one-half the crop. Almost our entire crop was ruined in 1891 in this way.

Bunches were very small this season, but, after the heavy rains ceased, the berries seemed to try to make up for the smallness of the bunch, being the largest I have ever seen. Some were almost two inches in circumference, *i. e.*, of the Worden. The Moore's Early were even larger than this. All vines were remarkably free from disease, and the berry was remarkably free from rot, which disease very much damaged our vineyard in 1890. An earnest advocate of spraying would say it was because I sprayed with the Bordeaux mixture. But my neighbors' vineyards were as free from disease as mine, and they did not spray. However, I sprayed but once, when in full bloom. I shall give it a thorough trial next year.

I allowed the Concords to hang on the vine very late, and they were very much damaged by the bees. Bees are a nuisance in the vineyard. They will destroy more than they are worth. I was forced to sell my Concords at 4 cents per pound; whereas, if I could have allowed them to remain on the vine 10 days longer, I would have received 5 cents. The vines made a remarkable healthy growth, and prospects for a large crop in 1893 are very flattering.

Our vineyard is situated on an eastern slope, light soil, with gravelly subsoil. We think, for a successful vineyard, any well-drained soil will do.

*Behavior of Varieties.*—Moore's Early: Very light crop; berry very large; free from rot; retailed for 7 and 8 cents per pound; vines made a fair growth.

Worden: Fair crop for this season; ripened 10 days before Concord, and is better flavor; vines made as good a growth as common. This is the Worden's greatest drawback—a very poor grower.

Concord: The old standby—a good crop of very fine grapes; vines made a remarkable growth.

Niagara: Yielded no fruit; vines made a good growth.

Pocklington: Bore a fair crop; free from rot.

Elvira: Bore a few grapes of inferior quality; vines made a very large growth.

Empire State: Yielded a few bunches; vines, very large growth.



Brighton: Very light crop.

Wyoming Red and Ulster Prolific: Made a good crop.

Wilder: Yielded a good crop, of excellent quality.

Vergennes: A large crop, of poor flavor.

A dozen or more other varieties were a complete failure.

The Worden has come to stay, in our estimation. It supplies the market before the Concord; is better flavored; its skin is very tender; hence it will never be a good shipper.

What we need in grapes is quality more than quantity. Quantity destroys the market; quality builds up a market. To the grape grower, I would say: Grow less pounds and more attractive fruit, and your profits will be much more.

No one should be without this fruit. It is so easily grown. We cannot expect to grow grapes of good quality without great labor, time, and careful study. We trim in fall usually, and train on the horizontal arm and spur system. We are not able to report the best method, as we are young in vineyarding. However, we do know an untrimmed vine will bear three times the quantity of grapes, of third-rate quality. So, we say, trim close. We do not prune in summer. We may try it in the future.

It is very seldom, if ever, the grape crop fails; hence, every one who possesses the land should plant a vineyard, and, with fair treatment, will reap a harvest; but, remember, "there is no excellence without great labor."

### HANDLING FRUITS.

REPORT OF STANDING COMMITTEE, BY D. DOYLE, OF OSWEGO.

This is a subject of vast importance to the horticulturist of Kansas. We will begin with the strawberry. As this fruit is soft, it must be handled with great care. It must never be picked to ship when wet with dew or rain. The picker must take hold of the stem instead of the fruit; pinch it off say one-fourth of an inch long, being careful not to bruise the fruit. Put the very ripe berries in one box, and the moderately ripe in another; the former for the home market, and the latter to ship. Ship in crates holding 24 quarts; put in the bottom tier of boxes, and cover the berries with maple or cottonwood leaves. Then put in the last tier of boxes and cover with leaves as before, having the boxes full, but not so full as to mash the fruit. Nail on the top, mark plainly, and it is ready to ship. The above will apply to all kinds of small fruit, including cherries. Peaches should be picked with great care; not too green or too ripe. If too green it spoils the flavor, and if too ripe they will not ship well. Pick in baskets lined with some kind of cloth, so as not to bruise the fruit. Take them to some convenient place to sort. I use one-third-bushel boxes. Pack close and neat, until the box is a little over level full, and then nail on the top.

Pears. This fruit must be picked before it is fully ripe, and laid in a dark, cool room or cellar to bring out its good qualities. As a rule, when the stem parts easily from the branch is the time to pick them.

Apples. As to the time to pick, there is a difference of opinion. Some think they should hang on the tree as long as possible, so as to color up well. I find the further south you get the earlier you must pick them. Apples stay on the tree about the same length of time north and south; hence the reason for picking earlier south. In southern Kansas, apples bloom two weeks earlier than in northern Kansas; hence they must be picked two weeks earlier than northern apples. It is a good plan to pick when the apples begin to fall from the tree, and lay them in piles under the trees to color up; then pack in barrels and ship, or haul to market for some one else to ship, being careful to sort out all the damaged ones. If packed in

barrels, let them be perfectly dry. Begin the bottom layer with stem end down, and finish with stem end up; fill full; lay on the head, and press down into the grooves; tighten the hoops, and mark the kind of apples and place of shipment on the head, and they are ready.

### NURSERY STOCK.

REPORT OF COMMITTEE, BY A. WILLIS, OF OTTAWA.

Having had no opportunity to consult with the other members of the committee in relation to this report, it will be brief, and, no doubt, less in value than I might otherwise have had.

1. *The Growth of Nursery Stock.*—The soil and climate of Kansas seem especially adapted to the propagation and growth of the apple, peach, native plums, and apricots. In many places grapes do well, making a strong growth and fine, healthy plants. Cherries, also, some years do very well; other years not so well. Pears, standards and dwarfs, while in some cases doing well, have not been sufficiently successful to give very much encouragement for their culture in the nursery. Our experience has led us to believe that, while not always true, we can generally get better trees from the East than we can grow. We have no experience with the propagation of currants and gooseberries, but presume fair success may be had with them in favorable localities. For soil, we prefer a good quality of upland, though a stronger growth may be secured on bottom land. We believe, however, a better tree may be grown on upland, and we know a tree, for any use, can be grown large enough on good upland in two years. Ornamental stock, such as roses, are little grown in Kansas, though we know of one firm which makes somewhat of a business growing them, and have had some fine plants from them. Ornamental shrubs and trees and evergreens are much less grown in Kansas than in the East, we presume, for two reasons: One is, a less favorable climate. This applies especially to evergreens. Next, our country is comparatively new, and the attention of our people has been confined much more closely to the cultivation of the useful than in older sections of the country. We hope in time to see an increased demand for such of the ornamentals as can be successfully grown in this climate.

Insect enemies: These sometimes are troublesome and sometimes destructive, but, with a proper use of insecticides, serious loss need rarely be suffered. May not the average farmer propagate such nursery stock as he needs and plant of his own growing? We would say he can, but generally not at a profit; as an attempt to raise an amount of stock such as most men need would result in failure. When the continued care needed for two or three years is considered, the small amount of stock that can generally be used would often be neglected to an extent that would prevent the propagator from giving such care as would secure the best results. The nursery business seems to be a business separate and independent, as much so as blacksmithing, carpentering, or merchandising. As a whole, we would say, Kansas is a good state in which to grow nursery stock, but, to secure the best results, it requires close and careful attention.

We will now give a little attention to the distribution of nursery products among the people. This is a matter of great importance. The people want the products of the nurseryman and the nurseryman wants to sell, and the question is, How to get the trees the customer wants to him in the best condition at the least expense? Many ways have been tried, but none of them are satisfactory. The most natural, reasonable way would seem to be to produce the stock, and, when ready for market, put it on the sale ground and serve customers as they come with what they need; and, to insure trade, do an amount of advertising. But a sorry experience, after years of effort, led me to abandon that plan to dispose of my stock. I was foolish enough to suppose that people would prefer to come to the nursery

and buy at reasonable prices rather than patronize "tree peddlers" at high prices, and especially when by so doing they were directly contributing to the building up of home industries. But I found out better after awhile. The average man would rather pay a drunken reprobate with a glib tongue, who comes from any place at a distance, 25 cents each for apple trees, crooked, damaged in root and top, untrue to name, and in no single quality worthy of being planted, than go to his nearest town and buy, of known, reliable men smooth, clean, thrifty trees of good size and true to name, and pay only 10 cents each for them. If he happens to get from a traveling salesman good, thrifty stock, all the better; but if he don't, he will growl and, possibly, curse, and then give a new order to the next agent that comes; and the bigger lie and more unreasonable story the agent tells him, the bigger the order he will get. Do you say this picture is an exaggeration? Let me tell you I know by sorry experience that in the majority of cases it is not, and I appeal to every nurseryman if the picture is overdrawn. I assure you it is not. You may go to a town and propose to establish a nursery, and the people will pat you on the back, and tell you how glad they are, and how they will patronize you; and then, when you have settled down to business, they won't even buy their apple trees or hedge plants of you, let alone buying anything that has a margin for profit in it. No doubt many will smile when they read this, but this may not seem important to the disinterested. It is a serious matter to the nurseryman. It is support or starvation for himself and those dependent upon him. So, after faithful, long-continued effort and final failure, he finds the people do not intend to patronize him. He turns his thoughts to some other means to find customers. He looks over the field, and decides to establish a wholesale trade; but after a little effort he finds that to carry an assortment of stock that will justify dealers and nurserymen in attempting to supply themselves from his stock requires an amount of capital few can command, and abandons the plan as impracticable. The last resort, and one most generally in practice, is the growing of stock for supplies to salesmen. While this leaves a smaller margin of profit, it has many advantages to both the nurseryman and the planter.

First, it enables the nurseryman to sell his stock.

Second, it places the stock at the door of the planter, it is true, at a greater cost than if bought directly of the nurseryman. But if the planter prefers such methods for getting his stock, he must expect to pay the additional expenses.

Third, it puts the customer farther from the nurseryman. This, to say the least, is very unsatisfactory, as it opens the way for numberless mistakes and impositions on both the nurseryman and the customer that would not otherwise occur. It also, in many cases, makes more difficult the correcting and adjustment of those mistakes, and has done much to bring the nurserymen, as a class, into disrepute.

But there is a brighter side to this picture. There are many honorable men in the nursery business, and comparatively few dishonorable ones; there are many honorable nursery salesmen—very many more honorable than dishonorable—and both have contributed their full share to the wealth and prosperity of the state. People who plant are often careless and neglectful. You cannot plant trees in the spring and gather fruit in the fall. It takes several years to obtain fruit. Men who should plant are indifferent, and their time is otherwise occupied. They want to plant, but they will put it off till next year; and so it goes. By such, no planting would be done but for the visits of industrious and constantly-urging nursery salesmen, and this has been done, and continued in spite of opposition and prejudice, until thousands of families in Kansas have fruit in abundance, and their homes are made glad and bright and beautiful because of the visits of the nursery salesman, that would otherwise know little of the taste or value of good fruit. There are plenty of homes in the state where the nursery salesman is considered a fraud, and he is

hooted off the place and never patronized, and if you were looking for a home you would scarcely ever stop to ask the price of such a place. On the other hand, there are multitudes who frequently patronize the nursery salesman, and who, finding it profitable, continue to do so. They have found out it pays to plant trees, and that, while the plan on which they buy may not in every case be what they could most desire, it is the most available one offered, and they welcome the opportunity to secure something to add to the beauty and comfort of home.

In regard to varieties: The voted fruit list for Kansas, that was published so many years, taken in connection with the experience of numerous orchardists who have been in business long enough to prove the value of varieties, now furnish a pretty safe guide to nurserymen for what to propagate. The same may also be said in regard to experience relating to varieties of ornamental trees and shrubs; so that it is believed, so long as customers confine their patronage to Kansas firms, there will be little difficulty about unreliable varieties being sent out. New sorts are being constantly offered, but rarely are they sold in quantities more than sufficient to make a fair test of value, and as results are reported, favorably or adversely, their propagation is increased or discontinued. It is believed that, as a whole, the trade and the stock offered by Kansas nurserymen will compare favorably with that offered by outside firms.

#### NOVELTIES IN NURSERY TRADE.

REPORT OF COMMITTEE, BY WM. CUTLER, OF JUNCTION CITY.

I have been asked for my views on novelties in the nursery business. This novelty business is of rather recent introduction, and the prime object in it is to make easy money. So the article must be something that the customer knows to possess extra merit, or something that he knows nothing about and is willing to take the salesman's word for it. And I am sorry to say that the originator or introducer of a new fruit is seldom, hardly *ever*, almost *never*, able or willing to give you the unbiased truth in regard to its merits. So don't be too hard on the agent who, after telling you all that he has heard, resorts to his imagination and adds the little it may lack of perfection rather than miss a sale.

The hasty introduction and rapid dissemination of new fruits, as well as of old ones renamed, usually brings them before the public so far in advance of any real, tangible knowledge, that the purchaser should use the same precaution that he would in betting on an election—only risk what he can afford to lose.

Do not understand me to intimate that there are not valuable new fruits being introduced every year. Far from it. Horticulturists are not the people who stand still or go backward. We always hear of the best new fruits through some disinterested parties—not an exaggerated patent-medicine description, written by the originator, with pictures "Before and after taking." This kind of swindling, if it is a swindle, can never be stopped while the average farmer is so ready to believe strangers and pay double price for a fruit he knows nothing about.

It is safe to conclude that, where a profusion of printer's ink is used to praise any new thing, some one is anxious to realize before the truth is found out.

I will now call your attention to a novelty that is deceiving hundreds and costing thousands of dollars. It is pushed upon you by interested parties, and its extra merits proven by false theories and misrepresentations. I refer to the "whole-root graft." The advocates of this theory claim a great increase in root growth, longevity, and everything that helps to make a perfect tree; and to judge from their photographs of whole- and piece-root trees, you would conclude that the half had not been told.

Still, in the light of all this knowledge, I assert that every variety of fruit or for-

est tree has its own peculiar habit in growth and proportion of root and branch, it matters not whether grown from a whole root, piece root, layer, or cutting. By the time the tree is two or three years old and six feet high, it has established its equilibrium, and no human device has ever altered or improved on it. I am aware that I am taking a bold stand against high authority; therefore you must allow me to go back over 50 years, come gradually down to the present time, and then call for help to prove my assertions.

In 1835, my father and family moved from New Jersey to Adams county, Illinois. He took apple seed along to grow an orchard from, as there were no nurseries there. The best of the trees grown from that seed were planted out as seedlings, and the crooked, rabbit gnawed and every sucker was bent down into a trench, and cions stuck through them every six inches apart. By the next spring the most of them had formed some roots, and were cut apart and set in rows, and in two years more were planted in the orchard. I never saw a more successful orchard than they made.

In about 1838, a neighbor went up to Hancock county and bought trees that were grown from layers. These trees grew very large, bore well, and some of them were alive and healthy when I last saw them, then over 50 years old. These orchards were not grown from whole-root grafts nor from piece roots; they had no roots until they made them.

Now, gentlemen, I will attack the lion in his den, and point out some serious objections to the whole-root graft. The length of root makes it unlikely that the graft will be set deep enough to strike roots from the cion, and still the root is nearer the surface and more exposed to the attack of that great and growing pest, the Woolly Aphis. Twice I have had the roots of apple trees in the nursery badly damaged by cold winters, and in 9 cases out of 10 the root on which they were grafted was killed, and life was sustained only by the roots that came out above the original root. Had they been on whole roots the destruction would have been complete. A few years ago I got some trees from Ames, Iowa. The roots on which they had been grafted were nearly all dead, and those which had grown from the cion were sound.

These facts, I think, are conclusive, that the way to grow a hardy tree for the North is to use a long cion on a very short root.

Now it is an old saying that "talk is cheap." It is also a saying that "seeing is believing." So I will stop talking and show you some specimens of trees.

Here I have samples of two-year-old Ben Davis; some grown from whole roots, some from whole cions, and others from first, second, third and fourth cuts of the same roots; also from very short roots, and from roots grafted top end down. Each of these is carefully marked, and accompanied by a graft exactly like those they were grown from. I will make no comment in regard to these trees, but ask the President to appoint a committee of three competent and impartial judges to examine them carefully, and hand in their report before this meeting adjourns.

On motion, this report was referred to a special committee. The President appointed F. Wellhouse, U. B. Pearsall, and Prof. S. C. Mason.

#### DISCUSSION OF THE PAPER.

F. WELLHOUSE: I cannot see any difference between long and short sections of roots in the growth of the variety grafted on them. As to hardiness, there is no dependence for it in the general stock of seedlings, as it is an accepted fact that they are both tender and hardy. I always cut the whole root into sections about four inches in length, for grafting.

Report of special committee on Mr. Cutter's paper:

# WHOLE ROOTS VS. SECTIONS OF ROOTS.

## REPORT OF COMMITTEE.

Your committee to whom was referred the exhibit of apple trees made by Wm. Cutter, of Junction City, Kas., with his article explaining method of propagation, beg leave to say that we have carefully examined the same, and find that those grown from whole-root grafts are well rooted and have made a fair wood growth, but no better than those grown from sections of roots.

Your committee regard the whole-root process of propagation, at least of the apple, objectionable, because the roots supporting the tree wholly develop from the seedling roots used, and which are known to be unreliable in hardiness, and the length of the "whole-root graft" is a difficult form to plant, while, with the "section-root grafts," the system of roots develops largely from the cion used, and, if the cion be from a known hardy variety, trees thus grown are reliably hardy. For these reasons your committee decidedly prefer and recommend the use of sections or pieces of roots in the propagation of the apple.

Your committee find the experiments conducted by Mr. Cutter, as illustrated by his exhibit, very interesting and instructive. Those made to determine the comparative value of different parts of a root when cut into three or four pieces, and beginning with the first cut, which included the collar, fully show that the second cut produces a tree preferable to all the others, but does not demonstrate a sufficient difference to justify a rejection of the remaining portion of the root in propagation.

The experiments illustrated in the use of long and short cions show that neither a very long or very short cion is desirable; that a length of from 6 to 12 inches produces the best results.

In conclusion, we recommend a vote of thanks to Mr. Cutter for these valuable experiments, and express the hope that he and others may continue and enlarge these investigations.

F. WELLHOUSE,  
U. B. PHARSALL,  
S. C. MASON,  
*Committee.*

On motion, the report was unanimously adopted, when the session adjourned to 7:30 o'clock P. M.

## EVENING SESSION.

THURSDAY, December 8, 1892.

President Houk being called away, Vice President M. Allen presided.

The evening exercises were opened with the report of the Committee on

## VINEYARDS.

BY G. F. ESPENLAUB, OF ROSEDALE.

The winter of 1891-'92 being very mild, all varieties of grapes were uninjured when spring opened. The fruit buds or eyes were unusually well developed, so much so that double and treble shoots were very common on most varieties. These, of course, had to be thinned to one strong shoot. The very wet and cold weather of spring gave way to more favorable weather as the time approached for blooming, and most of the leading kinds set a very heavy crop of fruit. About the time the Concord came into bloom a heavy rain set in, and rather a light crop set of that variety and some others that bloomed about the same time; but more favorable

weather followed, and all fruit set grew to large size in bunch and berry. The dry weather that followed made it almost impossible for rot or mildew to get any hold, and a very satisfactory crop was harvested everywhere, and owing to a very short crop of nearly all other fruits, especially of apples, peaches, and pears, grapes brought very satisfactory prices, from the earliest to the latest. A number of vineyardists prepared themselves in the early part of the season with spraying outfits, to fight the rot and mildew. But with all who used the remedies and those who used none, there was no visible difference in the quality or quantity of the crops of one over the other. But this should not deter anyone from preparing for war in times of peace. There is hardly any doubt that mildew on grapes can be prevented and rot kept in check by timely sprayings. Of varieties that bore unusually heavy crops the past season may be mentioned Martha, Elvira, Ives, Telegraph, Worden, and Goethe. Moore's Early has been offered on the markets in larger quantities than heretofore. The same can also be said of Champion, the former bringing the highest price; the latter is not a good grape, but its productiveness and early ripening make it a profitable sort. But for quality there is none of the very early grapes that can compare with the Jewell. Of the latest sorts, the Wilder and the old Isabella have proved profitable of the blacks, and the Goethe of the red or light colored. There is a limited but growing demand for a good red grape, and it is yet uncertain which will carry off the prize for best, the Delaware, Moyer, Ideal, Wyoming Red, Ulster, or Munson's Brilliant.

The discussion following this report presented the Goethe, Niagara, Telegraph, Mascot, Catawba, Dracut Amber and Perkins as specially desirable sorts to plant.

#### BOTANY AND VEGETABLE PHYSIOLOGY.

REPORT OF STANDING COMMITTEE, BY D. W. JACOBY, OF ABILENE.

In choosing the subject of my report on botany and vegetable physiology, I have taken one that is old, yet important: the pollination of flowers. No question in vegetable physiology has had more attention than this one, nor is of more importance to the horticulturist. Our best fruits have been and are improved by cross fertilization.

There is a striking analogy in reproduction in the animal and vegetable kingdoms. In each there is a sameness by inbreeding. In each there is a deterioration by inbreeding, and an improvement of the species by avoiding it. As an example of the former, we have the wild beasts of the forest. It is said the rabbits on the island of Porto Santo originated from a single female 470 years ago, and are still vigorous.

In the vegetable kingdom we have the trees of the forest. A lonely oak may stand with not another within many miles, yet produces acorns from which grow oaks the same that grew a hundred years before.

Of plants, we have many weeds that grow by the roadside: thistles, plantain, etc.; they are everywhere vigorous, yet they are self-fertilized.

Of my second proposition, we have the domestic animals and man; and of the vegetable kingdom we have the cereals, flowers, and fruits.

Pollen is the dust or fine powder produced on the anther.

Pollination is the conveying of the pollen from the anther to the stigma.

Fertilization occurs after the pollen reaches the stigma.

Germination is the first beginning of vegetation in the seed.

After the pollen reaches the stigma it passes down the tube in the style, where it is nourished till it reaches the ovule, where fertilization takes place. In many plants

fertilization takes place at once. In others it requires several months, while in the Scotch pine it takes a year.

Flowers can be cross fertilized and close fertilized. In the former, the pollen comes from another flower; in the latter, from the same flower.

Pollination occurs in various ways: by the wind, insects, animals, birds, water, and by artificial means.

In wind-pollinated flowers the sexes are often separated. They occur in different flowers — one flower staminate, the other pistillate. Both kinds of flowers may be on the same plant or on separate plants. Of the latter, we have the strawberry as an example. Flowers may be on separate parts of the plant. Of these we have corn as an example. The stamens are at the top, and called tassels; the pistils are found in the axils of the leaves. Each kernel has coming from it a long, silken thread, which conveys the pollen to the ovule or kernel.

I had an example during the past year of the distance that pollen in corn is carried by the wind, and the immediate influence it has on the seed. I had a field containing about 25 acres of pure white corn. On the south of it my neighbor planted some pop corn of a blue-black color, probably the Black Mexican.

When I husked my corn, I found black grains in it, almost across the field; the number of grains on an ear decreasing as the distance increased from the black corn. I learn from this the necessity of care in planting that which it is desirable to retain in its purity.

In wind-pollinated plants the pollen grains are dry and light, while the stigma is viscid and adapted to retain the pollen when it comes in contact with it.

The failure of our corn by hot winds is due to the drying up of the viscosity of the stigma. It may also, in part, be due to the scorching of the tassel; but my observation during the past few years leads me to believe that there is usually enough good pollen left to fertilize, if the pistils are not destroyed. In this class of plants there is usually a superabundance of pollen. As, for example, in passing through the cornfield, you will find the leaves and ground sufficiently covered with it to give it a yellowish color. This same superabundance is also shown by some of our woody plants, namely the pine. Pollen is rich in nitrogen and other plant food; hence I believe that, if every other row or even two rows out of three be detasseled, the yield would be materially increased.

Of the plants fertilized by insects, we have clover. Experiments have been made to show that clover must be cross pollinated in order to get seed. The following experiment was made at one of our experiment stations: "Two plants of red clover were covered to prevent insects from getting in. In one plant nothing was done, to see if self-pollination could take place. In the second case, which was a white sport of red clover, artificial pollination was effected with its own pollen. In neither case seed was obtained. Whenever pollen of another variety was used, seed was obtained."

In Australia much difficulty was experienced in obtaining clover seed until the introduction of the bumblebee.

Under our last head we have the experiments now being carried on by transporting the pollen many miles. These experiments have demonstrated that pollen can be shipped across the continent and germinated six weeks after its arrival.

In these experiments the line of work is as follows: For mother plants, apple trees were selected from the hardiest trees and crossed with pollen from our very best winter sorts. The purpose of the cross is to improve the quality and keeping capacity of the fruit, and yet retain the perfection of foliage and hardness of wood. Of pears, they are using the wild pears of the upper Volga and crossing them with



our best native sorts. Of plums, the natives are being used for mothers and pollen from the Oregon peach plum and other desirable sorts.

An instance is given of two seedlings of a thornless species of gooseberry from the Amur river, in Asia. During the past three years they bloomed profusely, but not a single berry was formed. When some of the blossoms were fertilized with pollen of the Triumph and Industry, fruits were formed in almost every instance.

"As the Amur bushes are models of health and vigor of growth, and perfectly smooth in branch and fruit, we have reason to hope for valuable results from the crossed seeds, which appear to be perfect."

To me these experiments are interesting; yet we must not expect too much. While the Concord grape is the best all-purpose grape on the list, probably 10,000 others produced in the same manner have been cast aside as worthless.

There are instances where cross fertilization does not produce different varieties. The writer knows a large yellow peach, locally named the Chalmers peach, that has been grown on different farms in the vicinity for probably 15 years, and is to-day the same as when first planted. The Iowa Experiment Station experimented by cross fertilizing some 10 different varieties of apples with the Oldenburg, without any new results. The apple was still an Oldenberg.

Frequently a horticulturist has a fine plum or other tree that blooms profusely every year and never has any fruit. Let him select a variety that blooms at the same time and is rich in pollen, and he doubtless will have fruit on his otherwise barren tree. Finally, what effect can we expect from cross fertilization.

Darwin made many experiments to determine the superiority of cross-fertilized plants. "A plant of cultivated morning-glory, grown from carefully-selected seed, when ready to flower was protected so that insects carrying pollen might be excluded. Ten flowers were fertilized with pollen from the same flower. Ten other flowers on the same plant were crossed with pollen from another plant. The cross- and self-fertilized seeds were placed in damp sand, and allowed to germinate. The two kinds were then placed under the same conditions. This was done during 10 generations. At the end of the experiment, the product of the cross was superior to the self-fertilized in every respect. In productiveness of capsules, the ratio of crossed to self-fertilized, in the third generation, was as 100 to 38."

"Two tulips, in separate pots, were brought into the house shortly before the flowers opened. Gauze bags were tied over each of the flowers. When full grown the gauze was removed. One was self-fertilized and the other cross fertilized. Both were again covered with gauze, and left undisturbed. The result was that the cross fertilized developed perfect fruit, containing seeds capable of germinating. The close fertilized produced a stunted capsule, with seeds incapable of germination."

Behrens says: "Cross fertilization produces the greatest number of seeds capable of germinating, while self-fertilization tends to produce few or no seeds capable of germinating. The plants from the self-fertilized are, on the average, smaller and weaker than those from cross fertilized."

#### REPORT OF THE AUDITING COMMITTEE.

Your committee find, from an examination of the Treasurer's report, a balance in favor of the Society of fifteen dollars and fourteen cents (\$15.14). We commend the Secretary's report as worthy of your attention.

#### REPORT OF SPECIAL COMMITTEE ON CREDENTIALS.

Your committee beg leave to report that, considering the inclement weather, the attendance at this meeting has been quite satisfactory. The certificates of attend-

ants presented to your committee show that over 100 persons from outside points have been present, besides several delegates without certificates.

Respectfully submitted, E. J. HOLMAN, *Chairman.*

#### REPORT OF COMMITTEE ON FRUITS, ETC., EXHIBITED.

Your committee find on the tables some very fine fruit, which is well grown, in size and color, and free from insect injuries. This fruit has been raised in a portion of the state where only a few years ago it was considered impossible to grow good fruit.

Among the exhibits of seedling apples, we notice one which your committee considers worthy of propagation.

A very fine plate of Early Ohio potatoes is exhibited by E. F. Walter, Wakefield.

A new winter variety of nutmeg melon, of fair quality; cuttings of Mariana plum and grapes, by Jas. Martin, are very fine. Respectfully submitted,

WM. CUTTEE, *Chairman.*

#### REPORT OF COMMITTEE ON FINAL RESOLUTIONS.

*Resolved,* That the members of the Kansas State Horticultural Society, in its twenty-sixth annual session assembled, at Winfield, Kas., December 6, 7, and 8, 1892, extend to the citizens of Winfield their sincerest thanks for the hearty hospitality they have shown.

That especial thanks be tendered to the Cowley County Horticultural Society for entertainment furnished, and for their encouraging and active sympathy in the purposes and work of the State Society.

That the Kansas State Horticultural Society recognizes the obligations it is under to the Southwestern Methodist Episcopal College, of Winfield, for the kind interest shown, and particularly for the enjoyable music furnished.

That the thanks of the Society be tendered to the railroad companies for courtesies granted; also to the M. E. church and to the United Brethren, for entertainment in their splendid edifices.

F. A. WAUGH, G. H. BENSON,  
U. B. PEARSALL, E. J. HOLMAN,  
*Committee.*

On motion, the foregoing reports were adopted, and the session was adjourned *sine die.*

PROCEEDINGS  
OF THE  
TWENTY-SEVENTH ANNUAL MEETING,  
HELD AT  
HOLTON, JACKSON COUNTY, KANSAS,  
DECEMBER 5, 6, AND 7, 1893.

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MORNING SESSION.

TUESDAY, December 5, 1893.

The session was called to order in the courthouse, at 10 o'clock A. M. In the absence of both President\* and Vice President, the Hon. Edwin Taylor was elected to preside, and Samuel Reynolds was temporarily elected to fill vacancy\* in the Secretary's office during the meeting. The exercises opened with prayer by Rev. Dr. Swaney, of Holton, after which the President appointed the following

SPECIAL COMMITTEES.

*Credentials.*—B. F. Smith, G. W. Bailey, and W. T. Jackson.

*Membership.*—D. C. Burson, F. W. Dixon, and J. F. Cecil.

*Resolutions.*—F. Holsinger, B. F. Smith, and Samuel Reynolds.

*Obituary.*—Samuel Reynolds, E. P. Diehl, and F. W. Dixon.

*Program.*—J. W. Williams, W. B. Talbot, and G. W. Bailey.

*Exhibited Fruits.*—J. F. Cecil, Mr. Whipple, and S. W. Burtch.

*Reports, Addresses, etc.*—E. P. Diehl, A. Willis, and G. W. Bailey.

*Suggestions for the Good of the Society.*—F. Holsinger, B. F. Smith, and S. W. Burtch.

*Constitution.*—W. T. Jackson, J. F. Cecil, and D. C. Burson.

*Auditing of Accounts.*—A. Chandler, E. P. Diehl, and B. F. Smith.

The Treasurer's report was then read, and, on motion, referred to the Auditing Committee.†

ORCHARD CULTURE.

BY JOHN J. CASS, OF ALLISON.

Orcharding in northwestern Kansas is as yet in its infancy. The country is new. Little more than a generation has passed since the buffalo disputed our billowy ranges of mesquite with his more tender bovine relatives from the East. The horti-

\*Owing to sickness.

†See Department of Finance.

culturist, as well as the farmer, but in a greater degree, has here to contend with a prejudice which is found among pioneers, and which has always been found, more or less, among pioneers everywhere, against the undeveloped resources of the country. Moreover, this country, speaking from the outlook of the fruit grower and farmer, is in a state of transition. The climatic history of eastern Kansas, which was at a later period rewritten verbatim for the central portion of the state, which tells of the substitution of beautiful homes and fertile fields for a desert plain, and of an atmosphere of equable humidity for an arid one, is now being repeated for us. Each year the breaking plow makes fresh and devastating inroads on the prairie sod, beautiful homes are being built, and these have generally their ornamental grove, shelter belt, and orchard. Fully half of the orchards first planted have, of course, gone the way of pioneer orchards generally—been horn pruned, girdled by rabbits, died of weeds and lack of cultivation, or succumbed to neglect in some other shape or form. Occasionally an orchard has been planted in the beginning of a prolonged drought, and died, through no fault of the planter, before it secured a foothold. Where, however, a fruit tree of ordinary hardiness has made one season's growth, the worst drought will not seriously affect it.

*Our Soil.*—Uniformly throughout northwestern Kansas, the upland soil, to a great depth, is the light-colored plains marl, rich in organic and chemical constituents, its surface, for several feet, darkened by vegetable humus. The bottom lands are alluvial. Trees take kindly to those soils, and find no wet subsoils, hardpans or heavy, impervious clays to contend with.

*Our Altitude*, ranging from over 2,000 to 4,000 feet above sea level, places us in an isotherm different from and colder than the rest of the state. This, with our light, dry atmosphere, gives us a climate peculiarly our own, from which I infer that the fruits which will prove best suited for us are not those now common to eastern Kansas, but that it will be the pleasant task of our future pomologists to select or propagate them.

Although our country is very young, it is old enough to demonstrate that orcharding is a success. Many of our pioneers have planted orchards which are to-day in successful bearing, and we have hundreds of thrifty orchards which will bear fruit within a year or two. Among our noteworthy orchards are those of Christian Miller, D. Nettleton, and Jas. Peake, of Lenora (the first named having borne since 1884), P. L. Ashcroft, of Dreden, S. S. Miller, John Steiner, and Isaac Clark, of Oberlin, and W. A. Mikesell, of Atwood. There are doubtless many others in other sections equally as good.

The best-known hardy varieties of apple, pear, apricot, plum and cherry thrive here. Peaches have been extensively planted, but are of doubtful success. Gooseberries do well, but other small fruits have not given satisfaction, so far, unless with irrigation. Grapes grow and bear well, the Concord being, so far, the favorite. Among apples, Ben Davis is the most planted, and is, here, hardy and vigorous. In my experimental orchard of many varieties, I find nothing to exceed the Haas in vigorous growth. I note that the Rawle's Genet bears when the bloom on other varieties is killed by early frosts. Hence, I infer the greater value of late-blooming trees, and believe a list of common fruits, with their dates of blooming, would be of value to our planters. The Wild Goose plum, Early Richmond and Morello cherries and Bartlett dwarf pear are all notable successes. The orchard of Mr. Isaac Clark, of Oberlin, deserves special mention as an example of the capabilities of our soil and climate. It consists of 40 acres, on the slopes of Sappa creek, and about 100 feet above it. It is quite rough, being seamed by ravines, toward which the fields slope from every direction, thus giving an excess of drainage, which, in a country of but moderate rainfall, would seem to be an unfavorable location for an orchard.

Mr. Clark purchased his trees as root grafts, in 1889, growing them for one or two years in nursery before planting them out. They are now all strong, free-growing trees, of about eight feet in height, with low, broad heads, and glossy trunks of about three inches in diameter. There are no gaps in the lines, every tree is in place, and each slope shows trees of equal vigor. In this unusually dry year of 1893, these trees made a wood growth of three feet, and show plenty of fruit buds. His varieties are mainly Ben Davis, Maiden's Blush, Cooper's Early, Winesap, (Fall) Rambo, and Rawle's Genet. The orchard receives clean and mellow culture. Mr. Clark is growing nothing in it this year but melons, for which he has found profitable sale in the adjacent city of Oberlin.

#### DISCUSSION.

W. T. JACKSON, Topeka: Apple trees should be planted 16 feet apart in the row, and the rows 32 feet apart. A crop of corn may be grown between the rows during the first few years. For working the ground, a two-horse cultivator is the best implement. The Sherman steel harness for the team while cultivating is very useful, as no doubletrees are required, and, hence, the danger of barking any of the trees is avoided. This harness was fully recommended by others. Close attention must be given to protect the trees from attacks of the Round-headed Borer and rabbits. The first are easily removed with a sharp knife, which should be done on first appearance. For the rabbits, use box traps in the tree rows as soon as the first falling of snow occurs. Wagon grease, used by some orchardists, has not been reliable as a protection.

F. HOLSINGER, Rosedale: Cultivation not only increases the size but the quantity of the fruit.

B. F. SMITH, Lawrence: I believe in pruning liberally in closely-planted orchards. Corn grown among trees affords a protection from sun scald.

On motion, the session adjourned.

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#### AFTERNOON SESSION.

TUESDAY, December 5, 1893.

The meeting was called to order, and the President announced the following:

#### COUNTY FRUIT REPORTS.

JOHNSON COUNTY—By J. W. Cook, of Olathe: Apples failed in a crop this season, cherries were about one-third, and all small fruits a light crop. The wood growth in old orchards was good, and in younger ones very large. The present prospects are promising of a good crop in 1894.

DOUGLAS COUNTY—By B. F. Smith, of Lawrence: Apples and pears were nearly a failure in crops. Of the varieties of apples, the Smith's Cider bore a fair crop. Strawberries and raspberries were one-fifth of a crop; blackberries an average one. Orchards are in good condition, (excepting old ones, which are decaying,) and promise a good crop another year.

Dr. A. Newman, of Lawrence: From my orchard, which usually yields 1,000 bushels annually, I gathered only 50 bushels the present season.

SHAWNEE COUNTY—By D. C. Burson, of Topeka: About the same conditions exist in my county as have been reported for Douglas.

J. F. Cecil, of Topeka: The apple crop has failed in my county for the past two

years. Smith's Cider was the only sort that continued productive. From an orchard of 125 trees, 500 bushels were gathered. The highest points of land were most productive. Of cherries, the English Morello yielded the best crop. Pears were very scarce. Spraying did not seem to benefit small fruits. Apple orchards were healthy throughout the past season.

**JACKSON COUNTY**—By F. W. Dixon, of Netawaka, and J. W. Williams, of Holton: The apple crop was very light. Smith's Cider and Maiden's Blush bore the best. Pears failed. Grapes, a good crop. Prospects are good for a crop in 1894.

**WYANDOTTE COUNTY**—By F. Holsinger, of Rosedale: The apple and cherry crop was very light. The Heath Cling peach produced a second crop in some localities, which was fairly good. Kieffer pear trees are the nearest blight proof and prosperous of any. Strawberry and raspberry plantations bore rather light crops; grapes, a good crop, which commanded paying market prices.

A. Chandler: Strawberry plantations are in poor condition. The spring setting was not very successful. Raspberry and blackberry plantations are in fairly good condition. The crop of grapes was good, especially of the Worden.

**NEMAH COUNTY**—By S. W. Burtch, of Centralia: The Ben Davis holds the lead in our apple orchards. Jonathan and York Imperial do well, and the Yellow Transparent is a favorite. Of pears, the Kieffer is the most successful, bearing at three years from the grafting; other sorts suffer severely from blight.

Edwin Taylor, of Edwardsville: Of apples, the Jonathan and Ben Davis are the most profitable sorts to grow for marketing. We can realize money enough from the Jonathans to enable us to hold the late winter sorts for good winter prices.

J. C. Randall, of Hamburg, Iowa [a visiting delegate]: The apple crop has failed during the last two years in southwest Iowa. The Ben Davis is our leading variety. The trees in my orchard are planted 16 x 20 feet apart, but with age the tops have become crowded. I would now set at 35 feet apart each way.

On motion, the session adjourned to 7:30 P. M.

## EVENING SESSION.

TUESDAY, December 5, 1893.

The meeting was called to order, when the President announced an

### ADDRESS OF WELCOME.

BY JUDGE J. H. LOWELL, OF HOLTON.

**MR. PRESIDENT:** It is my pleasing duty, on behalf of the people of this city, to extend their cordial and sincere greeting to the members of the State Horticultural Society and to visiting friends.

Since the opening of the Garden of Eden, down through the ages to the opening of the Cherokee outlet, horticulture has been the one great natural occupation of mankind. It is not only the science, but the art as well, of the cultivation of plant life, and, in all the avocations of mankind and womankind, there is none other where the percentage of recreation enters so largely as in the prosecution of horticulture. Its pursuit is a stimulant at once to brain and brawn. It is the one occupation which claims as its votaries all the peoples of the earth—civilized, semicivilized, and barbarous. From darkest Africa to sunniest Kansas, its benign influence has elevated the estate and modified the condition of mankind. As a science, its development is founded upon the doctrines of the "survival of the fittest." As an art, it caters to the æsthetic in our nature—the sense of touch, of taste, of sight. It is a

searcher for the true, the good, and the beautiful. All the romancers—Dickens, Thackeray, Cooper, Walter Scott, and Howells—have thrown around their best creations the halo and fragrance of flowers, of fruits, and of plants.

There is in nature the potential quality, through selection, of change and improvement; of retarding and accelerating the fruitage, the growth and product of all the species of the vegetable kingdom. We see it in the rose blooming in mid-winter; in the early-matured berry or apple; in the lately developed pear or grape; in fact, all plant life but awaits the hand and skill of the horticulturist to guide it from narrow limitations to a broader and better destiny. And in this quest nature and human intelligence work hand in hand. He who through "natural selection" should by patient endeavor place on our tables a matured tomato in the month of May would be a benefactor to mankind. The subject is too broad to more than generalize here, and I must not detain you. It is but just to say that the treasures of the orchard and the garden are multiplying year upon year, through the handiwork, the skill and intelligence of the horticulturist. This Society is designed to carry out the great ideas of progressive horticulture. We are glad to welcome you, and wish you great profit and pleasure in your deliberations.

### RESPONSE.

BY HON. EDWIN TAYLOR, OF EDWARDSVILLE.

The cordial welcome we have received is very pleasant and reassuring. We purpose to avail ourselves of it in full measure. The burden we now put upon you is one which about the time of the first snow is visited annually upon some city in our fair state. For whatever the conditions, financial, industrial, or political, the horticulturists of Kansas are bound to get together as often as once a year in a meeting which is at the same time an experience meeting and a hurrah meeting—that is, one at which we can learn from each others' experiences and also confirm each other in this horticultural faith, and generate enthusiasm enough to last us through another year. Bob Acres found his courage oozing out of his fingers' ends; and now, that we have had three flat successive failures in our staple fruit, it takes some little resolution to still keep the standard uplifted. There are numbers of horticulturists in this state whose expenses during the three years last past have been greater than their receipts. Such less-than-nothing returns are discouraging, but, so far as I know, none of our crowd have gone back to live on the wife's folks, or have lost faith in the ultimate permanency of the laws governing the succession of the harvests. They echo the sentiment of the Boston bridge to the Bunker Hill monument in Lowell's poem—

"It's a stiff gale, but Providence won't drown."

I said something about our enthusiasm. We can easily lay claim, I think, to being a people given to enthusiasm in and for our particular relationship with nature. We actually love our calling, and are here at this moment to advance and magnify it. There are not many of us, I presume, who expect to pick up at this meeting horticultural recipes that we can use in our future operations to advantage. But to us it is a pleasure to hear such veterans of the berry patch as B. F. Smith, or regulars of the apple orchard as Wellhouse and Jackson, recount their successes and their failures; have them, like Goldsmith's hero, "shoulder the crutch and tell how fields were lost and won."

Then, again, the sweets of the propaganda are relished by us the same as other people; our proselyting is not religious, or political—not even openly in favor of the spread of equal suffrage—it is the spread of this wholesome and humane calling, a calling which, on the ornamental and floral side, is elevating and ennobling. It not only seems to us, we *know*, that if in town and country we could but arouse peo-

pie to an appreciation of the loveliness of nature as manifested in plants and flowers, they would be the better for it. If we could leave behind us here such a microbe of horticultural interest as would take root in every family in this town, and lead to the planting of just one extra flower bed in each of your front yards, we *know* that when those beds brought along their succession of bright, soft colors and sweet scents for the lawn, for the mantelpiece, for the table, for the lappel, for the corsage, for the sick girl's room, they would bring with them also sweet influences that the tired mother, the dispirited teacher, the peevish child and the perplexed preacher would find helpful and comforting. If any word of ours would contribute in even a slight degree to awaken among the farmers of this great state a "realizing sense" of the loss that so many of them sustain by never turning their ear to these harmonies, we should be content.

Supposing every farmer's heart in this state (every farmer who does not already possess this horticultural salvation) could be touched by some sympathetic expression here to forthwith provide his family with a bed of asparagus, one of strawberries, long rows of raspberries, blackberries and grapes alone, and some hardy roses and sweet honeysuckle in every dooryard, what enjoyment and satisfaction to the family would flow from them. For the amount involved the returns are great. And yet I shall be surprised if half the farms in this state come up to my easy standard, greatly to the loss of the people on them.

Considerations such as these move us. Our hands are in the hands of all who share the sentiment. We appreciate your presence, because it shows that you, too, must be in sympathy with some feature of our movement. We bid you heartily welcome to all our sittings.

This was followed by an address from M. Mohler, secretary of the Kansas State Board of Agriculture, on the subject of

#### SUBSOILING AND SUBIRRIGATION.

Mr. Mohler clearly set forth the benefits to be derived from these systems of treatment; that in many places in western Kansas water can be furnished from wells as cheaply and with more certainty than from ditches. There are 17 irrigating wells in operation in Finney county alone. He regarded subirrigation as the best method for obtaining the best results. He also dwelt for some time upon the importance of beautifying and adorning the homes with flowers, shrubs, and trees for the comfort and happiness of the inmates.

#### A LETTER

FROM CHAS. W. MURTFELDT (AN HONORARY MEMBER), OF KIRKWOOD, MO.

*To the Officers and Members of the Kansas State Horticultural Society:*

At the second annual meeting of the Kansas State Horticultural Society, I had the pleasure of being present as the representative of *Colman's Rural World*, being its editor. To my great surprise, I also had the honor to be elected a member of your association; and I wish here and now to bear record that in my meetings with the Society, which have been frequent, I have always received the most gratifying evidences that there has never been an abatement of your distinguished considerations toward my humble self; especially was this the case the last time I had the pleasure and the honor of meeting with you, at Paola, December 3 to 5, 1889. Since that time, annually, I have looked forward to another meeting with your association, and a repetition of the "good times" consequent of such occasions, but I fear it may not be this year. I am getting old, and my health is precarious, but my affectionate considerations for my friends in Kansas, and especially for those of the Kansas Hor-



ticultural Society have suffered no abatement, and, should it please God, I may yet, at a future date, be able to take you all by the hand in friendly greeting.

Allow me yet to state, that I had the pleasure to look in upon your state building at the Columbian Exposition, at Chicago, several times, with ever-increasing delight. Certainly there was no equal exhibit of the fauna of any other state that came under my notice that could in any way compare with that of Kansas. As to the exhibition of fruits, Kansas was on a par with other states of the Mississippi valley in exhibiting (?) a general failure of the fruit crop, the growth of the season of 1893. But the gold medals, evidences of her former exhibits east, west, and south, testify that she has achieved wonders in growing fruits. With a favoring Providence, even greater things may be in store for her. None, even of her own sons, will rejoice more at her successes than the undersigned. The legend on your state seal is a good one, and cannot be improved upon: *Ad astra per aspera*. Let me add, *nil desperandum*.

May God bless your state, all of its institutions and all of its inhabitants, especially the members of the State Horticultural Society, is my sincere prayer.

This was followed by the reading of the

#### SECRETARY'S ANNUAL REPORT.

MR. PRESIDENT AND MEMBERS: Again we assemble to consider questions of great importance to the future success of our state horticultural industry; questions which demand intelligent and thorough consideration, and the determination of reliable methods of treatment.

We are all forcibly impressed with the fact that the usual order of things in the fruit line has become deranged, resulting in serious losses, and that there are destructive agencies among us is no longer a doubt, but what these are is an unsettled question. They may be fungus, electrical disturbances, meteorological, or of a neglectful order. Whatever they are, it is the duty of this Society to determine, if possible, means for the restoration of former productive conditions. It ought not to be possible for us to say we do not know; but if such is our predicament, then let us firmly resolve that we *will* know, and, on going to our respective homes, resolutely grapple with these troubles, determined to conquer them. And I will suggest that a special committee be appointed, of a dozen, if necessary, of your most intelligent and thoroughly practical and observing members, who shall fully consider this matter under the evidence they possess and are able to collect, and, by a report, bring the matter before the Society during this meeting for further discussion and an endeavor to get at facts and remedial methods.

The state has recognized this Society as the custodian of the horticultural industry by its appropriations of funds to its use, and the people rightfully expect intense application to matters of grave character in our work, and, if we shirk not the duty of the hour, our perpetuity as an organization will be assured.

There have been no special sessions of the Board since our last meeting. All business of importance has been transacted by letter.

There have been several local and county horticultural societies organized in 1893, but there have been complaints of a lack of interest throughout the state, owing, as is claimed, to the failure of fruit crops. With a return of fruitful years, undoubtedly will be awakened the old-time enthusiasm which usually follows abundant harvest.

#### THE WORLD'S HORTICULTURAL SOCIETY.

*To the Horticulturists of the World, Greeting:*

Immediately following the World's Congress on Horticulture, at Chicago, in August last, a series of meetings was held to consider the advisability of organizing a horticultural society which shall include every country of the globe. After much discussion, in which many eminent men from various parts of the world engaged, the World's Horticultural Society was organized, and the election of the

three general officers was held on the 25th of August. This new society is designed, in the language of the constitution, "to promote correspondence and to facilitate exchange of plants and information between the countries of the world." This society can coördinate and extend the work of all existing societies, compile statistics, promote legislation and education, prepare correspondence directories, diffuse all the latest information from the various parts of the globe, consider means of transportation, and facilitate the exchange of varieties and every commodity in which pomologists, viticulturists, florists, vegetable gardeners and other horticulturists are interested. The society will probably meet occasionally at the various international exhibitions, upon which occasions, also, it can greatly aid in procuring exhibits from all parts of the world.

The general charge of this great society resides in three officers: The president, vice president at large, secretary-treasurer at large. There is to be a vice president and a secretary-treasurer for each country, who shall direct the affairs of the society in their respective countries. The officers elected at Chicago upon the 25th of August, 1893, were: Prosper J. Berckmans, A. M., Augusta, Ga., U. S. A., president, a native of Belgium, but for many years a prominent pomologist and nurseryman of the United States, where he is now president of the American Pomological Society; Henri L. de Vilmorin, Paris, France, vice president, a distinguished horticulturist, scientist, and author, who is favorably known throughout the world; George Nicholson, secretary-treasurer, curator of the Royal Gardens, Kew, Eng., everywhere known as the author of the incomparable "Illustrated Dictionary of Gardening." Later the president appointed William F. Dreer, of Philadelphia, vice president for the United States, a man long and favorably known in the seed trade; and Mr. Dreer appointed Prof. L. H. Bailey, Cornell University, Ithaca, N. Y., secretary-treasurer for the United States. At this juncture, Mr. Nicholson declined the office of secretary-treasurer at large, as it would be inconsistent with his present duties. This is a source of great regret to his many friends and admirers. Until a successor is elected, the secretary-treasurer for the United States has consented to act in the capacity of general secretary-treasurer.

The society now requests the earnest and early support of its friends. The vice presidents of the various countries will be announced soon, and the organization will then be quickly completed. The society needs the coöperation of every enlightened horticulturist and every important horticultural organization.

PROSPER J. BERCKMANS, *President*, Augusta, Ga., U. S. A.

HENRI L. DE VILMORIN, *Vice President*,

L. H. BAILEY, Ithaca, N. Y., U. S. A., No. 22 Avenue de la Bourbonnaie, Paris, France.  
*Secretary-Treasurer for U. S., and Temporary Secretary-Treasurer at Large.*

A membership in this society is here suggested, and by it we will receive the publications of that society, which will be delivered to you at each annual meeting. These will probably be a benefit to us, and at the same time give our Society a prominence in our nation and before the world.

#### THE THIRD BIENNIAL REPORT.

This is now being published by the state, and there is a prospect of its being ready for distribution by the fore part of January. We are limited to an edition of only 2,500 copies, and to about 300 pages to each copy; so that only 2,500 persons out of about 80,000 who are directly interested will receive a copy.

#### OBITUARY NOTICES.

Since our last meeting, those inestimable friends and collaborators, Dr. J. M. DeBall, of Paola, and E. Snyder, of Acheson, have passed away, and will go in and out among us no more. They were earnest workers in the field of horticulture, and have erected their own monuments with deeds of sincere benevolence toward their fellow-men. They rest under the well-earned declaration of "faithful to the end."

#### NOMENCLATURE AND NEW FRUITS.

BY G. C. BRACKETT, OF LAWRENCE.

I cannot add anything of any importance coming to my knowledge during the year, excepting as regards the Idaho pear, viz.: The nomenclaturist of the horticultural department of the World's Columbian Exposition claims to have discovered that it is nothing more than that old familiar sort, the Sheldon. This was determined and settled upon after an examination of the specimens placed on exhibition in that department.

*New Fruits.*—I cannot report anything new in our state, but in lieu thereof will

read to you the predictions of an eminent horticulturist of what we, or, rather, some of our grandchildren, will enjoy in 1993. Now, while you, or those who had not the privilege of looking at the fruit show in the Oregon and Washington collections at the World's Fair, may be incredulous, I am not. The final outcome of the experiments now just in their infancy is purely speculative. When I behold pears weighing six pounds each, plums most as large as turkey eggs, peaches too large to go inside of a pint cup, and apples as large as small pumpkins, and then reflect back to the historical primitive size of these classes when man first undertook their improvement by culture, and thence on down to results of crossing and selection to the present date, I do not wonder at the probable results, if continued, predicted for 1993.

"HORTICULTURE IN 1993, AS SHOWN BY A SEED CATALOGUE.

BY CHRISTOPHER CABBAGE.\*

"After an evening spent in studying the many large and beautiful seed and plant catalogues of 1893, I laid back in my easy chair, and my mind wandered away through the misty future, and I seemed to see a postman coming up the graveled walk leading to the house, bearing a bulky package, which, when delivered to me, I eagerly opened, and found it to contain a book of such mammoth proportions as had never before been equaled, and printed in such brilliant colors that the rainbow would blush and the sun hide his face on beholding it. But what is it? It is the great masterpiece of artistic skill and beauty issued by "The Great Consolidated Universal Plant and Seed Company," and bears the date 1993. The first 150 pages are given up to a brief letter to the concern's patrons, telling of the monstrous growth of its business the past year, and asking for a continuation of the receiver's valuable patronage, and containing beautiful views of its imposing and mammoth buildings in all parts of the world, and also a list of the leading members of the firm, with oil paintings of them. Among the names are many whom I judge are descendants of some of the prominent seedsmen of a century before, and a firm containing so many men of such undoubted ability must of a certainty be worthy of the patronage of all mankind.

"Among the long list of prominent stockholders, I find the names of the Hon. Jules Verne Salzer, United States senator; Hon. Julius Cæsar Wilson, member of Congress; Hon. Munchausen Childs, governor of the magnificent state of Manhattan; Hon. Rider Haggard Everett, member of Congress; Hon. Geo. Washington Maule, mayor of Philadelphia; and many others, too numerous to mention. This beautiful book contains 3,000 pages and 300 full-page plates, in colors. The size of the page is 16 x 20 inches, and the book is bound in the finest of American morocco, beautifully embossed with gold.

"After the first 150 pages come the novelty and specialty departments, containing 350 pages, printed in old gold, on a beautiful pearl-tinted paper, and among the many new and rare plants never before catalogued we find the Great Mastodon asparagus, which grows 3 feet high and 4 inches in diameter in a single day; the Universal Plant and Seed Company's Giant Tree bean, which grows into a beautiful tree 7 feet high, bearing pods 3½ feet long and 4 inches through. The beans are 2½ inches in diameter, and there are from 12 to 15 in a pod. This new wonder is perfectly hardy, bearing year after year, and an average crop is 10 bushels per tree. The crop is good either as snap beans or for dry beans; in fact, no plant ever before produced has so many good points. Ten pages are devoted to this wonder alone; also a beautiful colored plate, in 35 oil colors. Single beans are sold at 25 cents each. There seem to be one or more new varieties of nearly every vegetable grown, but space will not permit mention of them all.

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\*R. N. Y.

"The Mammoth Ohlidsi celery seems to be a very distinct species, growing 3 feet high and 18 inches in diameter, and combining with its mammoth size the finest flavors ever known. There is also a new sweet corn called the Universal Plant and Seed Company's Early Mastodon Honey Sweet. It is fit for the table in 60 days from planting, and one ear is enough for a meal for a large family. It grows ears 2½ feet long and 8 inches in diameter, and there are often four or five ears to the stalk, and never less than three. Single kernels are 2 inches in length and 1½ in width and thickness, and they are all sweeter than honey. Single kernels of this wonder are sold at 50 cents each. Next comes the Superlative Giant cucumber, growing 5 feet long and 12 inches in diameter, and such a prolific grower is it that the cucumbers often lie three or four deep on the ground.

"The customers are offered two wonderful novelties in melons: One is the Munchausen's Early Mammoth Wonder muskmelon, which grows to a weight of 100 pounds, and averages 20 to 30 to a vine, and so very early is it that the first are ripe in 60 days from planting. The other is Cæsar's Mastodon Giant watermelon; and so great is the size of these that they are shipped on flat cars, with only one on a car; and there is a beautiful view of the grounds, with a long train of cars, each loaded with a single melon, in the foreground, and a vast field containing thousands extending away to the left.

"Among the large varieties of onions is Cæsar's Royal Mammoth Golden Giant, which weighs 35 pounds, and yields 5,000 bushels per acre.

"The company has 'some pumpkins,' also, that are worthy of mention, and the Washingtonian Mammoth Hard-shelled Rock-ribbed Gigantic takes the prize. Its only fault is its enormous size, making it impossible to move the specimens about for exhibition. They grow 10 feet in diameter, and the flesh is 3½ feet in thickness. A hole is made in one side and a small pig is put in, and he has abundant food close at hand to enable him to grow into a large hog. The hard shells are also cleaned out and used for houses, etc. A single plant will produce from 12 to 15 large pumpkins, so that, if one wants a house, woodshed, barn, and other outbuildings, all he has to do is to grow a single vine and clean out the shells, and he has all the buildings he needs for a large farm. Single seeds are sold at \$1 each.

"In tomatoes, they offer a large list of varieties, but the one that most favorably impressed me was the Gigantic Ponderosa Mastodonic Tree, which makes a strong-growing tree 30 feet high and as many in breadth. The fruits are very solid, often weighing 15 pounds each, and sometimes 25 pounds. A tree well cared for will produce at least three tons of fruit in an ordinary season."

"The turnip, too, has been greatly improved, and the Matchless Gigantic is surely a wonder, growing often to a weight of 250 pounds, and yielding over 20 car loads per acre. Field grains have a separate department of 200 pages, and I find some great improvements in all kinds; but the greatest wonder seems to be among potatoes, of which there is a list of 1,400 different varieties, headed by the celebrated Early Gigantic Mastodon, which yields 3,000 bushels per acre, single tubers weighing six to eight pounds, and they are fit for the table in 37 days from planting. About 250 pages are devoted to nursery stock and fruits of all kinds, among which I note Jules Verne's Royal Everbearing Columbian blackberry, which grows to the size of a tree 10 feet high, perfectly hardy, and bears fruit for years. Many of the berries are five inches long and three inches in diameter, and are ripe from June 1 until frost. The new Arctic King Tree gooseberry is another new fruit, reaching eight feet in height and bearing berries the size of large apples. A single tree will yield from 10 to 12 bushels per year. The Icelandic Mammoth raspberry is another valuable novelty. The fruit is often three inches in diameter, and a single bush will provide a large family

bountifully from June 1 until the snow covers it. It is also a wonderfully prolific, ever-bearing variety. The greatest wonder of all, however, is their Mammoth Columbian strawberries, which grow monstrous plants from three to four feet high, and the fruit grows on strong stems over three inches in diameter. The berries are so large that they are sold like cheese, being cut up and weighed out to customers. Single berries often weigh from 10 to 15 pounds, and the yield per acre is something immense, as each plant will produce from 1,000 to 2,000 berries, and they are ever bearing, yielding fruit from May 1 until winter closes in upon them. Another new plant is the Manitoban banana, perfectly hardy as far north as Hudson bay, and very productive. The concern also has a new hardy orange that will grow anywhere south of the Arctic circle, and a new race of Alaskan grapes that will put to shame even those found growing in the Promised Land by the men that were sent to spy out the country.

"One hundred and fifty pages are devoted to shade and ornamental plants, many of which are entirely new and exceedingly rare. Among them is the new race of hardy Arctic palms, which are perfectly hardy in all of the cold northern states. Roses have a separate department of 200 pages, and there are 20 colored plates. Among the new varieties is the African Wonder Tree rose, making a tree 20 feet high and bearing thousands of blossoms laden with the most delicate odors. The colors range from pure snow white through yellow, pink, red, purple, to jet black, all on one tree, and the blossoms are 8 to 10 inches in diameter. They are often cooked and eaten like cabbage, being greatly superior to that vegetable on account of their fine flavor. There are descriptions of about 2,000 varieties of the rose, among which are few of the varieties that were popular in 1893. Two hundred and fifty pages are devoted to aquatic plants, and here we find many wonders from Africa, Asia, and South America.

"Three hundred pages are devoted to flower seeds for the garden, among which are so many brilliant flowers that I can hardly select one for special mention; but perhaps the new Peruvian Monstrous Tree primrose is worthy of a notice. It is a rapid grower, attaining a length of eight feet in a few weeks, and from July to October is covered with large rainbow-colored flowers, measuring eight inches in diameter. About 350 pages are devoted to greenhouse plants, and the varieties reach far into the thousands, and are so fine that it is impossible for me to select any special varieties for mention. Following this are 300 pages devoted to the more common varieties of vegetable seeds, but there are many varieties that would have been considered wonderful if we could have had them in 1893.

"Next follow separate departments for farm and garden tools, poultry, rabbits, dogs, etc., etc., consisting of 500 pages in all. Among the new varieties of poultry is one now first offered. It is the Cæsar's Gigantic African Zulu. The birds are black, stand  $4\frac{1}{2}$  feet high, and weigh 80 pounds each if well fattened. They are sure death to rats, woodchucks, and all other kinds of small animals, which they kill and devour.

"There is also a special bulb catalogue, issued in the fall, of 1,000 pages, which the company hopes to make even more beautiful than this mammoth volume. In again looking over the letter to customers in the first 150 pages, I find that they have branch establishments in every state and country in the world, and large farms of thousands of acres in the states of Manitoba and Aurora Borealis, which lies several hundred miles north of Manitoba. These two states are now two of the most prosperous in the union, and a large part of their farm grains and seeds are grown on their large farms in those cold northern states. Moreover, they have large farms for trial grounds and for growing special crops in every country of the world."

I feel a shaking, and a voice exclaims, "Wake up! are you going to sit here and sleep all night?" and I stand up and find that it is still 1893, and the wonders I have seen are a long way in the future. Well, I have always been told to rejoice that I am permitted to live in this enlightened and prosperous age, but I am thinking it was a sad mistake, and I most heartily wish I had not seen the light of day so soon by a century, and then I could have had some things to be happy for. Oh, for just a slice out of one of those strawberries!

On motion, the session adjourned to 9 o'clock A. M. the following day.

## MORNING SESSION.

WEDNESDAY, December 6, 1893.

The meeting was called to order, and the President announced the standing Committee on Small Fruits.

### FRUIT REPORT OF NORTHERN DISTRICT.

BY MISS ANNA BOWMAN, OF LEAVENWORTH.

The season just passed will long be remembered by Kansas fruit growers as one of general failure in almost every variety of fruit, demonstrating with fatal clearness the uncertainty of horticulture in our latitude. Is our climate changing? Are the parasites which have infested the East, and made the grower's life a burden, infesting our fields and orchards? If so, we may as well "pull up stakes" and hie ourselves to verdant soil and pastures new. Every year we can reckon with less and less certainty on our returns. When the fruit is sold, and the money in our pockets, then, and only then, can we tell whether we will come out even or not. What summer suns do not scald, frosts nip, vagrant insect web, or some unpronounceable fungus attacks, and the fruit is ruined.

The uncertainty of our rainfall is one of the most serious drawbacks we have to fruit culture. Our state's mixed politics may have something to do with our climatic condition. If only our Solons would devote their energies to the artificial rainfall theory, it would furnish a harmless vent for their energies, and, as a possible outcome, we might have every man his own rain maker, and "droughty Kansas" would cease to exist.

The beautiful plates in the nurserymen's catalogues serve to keep the memory of the apple green. We have not seen the real thing for the last two years, and are speculating on next season's possibilities.

Very few pears came to market, and no plums. I saw plum orchards where everything known had been done to insure success, and still there was no fruit.

Almost the only cherries were the California product, and at such ruinous prices the housewife could not invest. Usually, with us, if the Early Richmond fails, the English Morello, coming in later, escapes frost or excessive rains and yields a fair crop; but this season, what fruit hung on till maturity was too worm eaten and imperfect to market. The oxhearts and fancy varieties do not bear at all.

Gooseberries, where taken care of, yielded well, and sold readily at \$2 per crate.

Currants were very profitable where given proper attention. The average price paid was \$2.25 per crate, and the supply wholly inadequate to the demand. The old Red Dutch is the favorite, and can be made, with proper cultivation, to rival the Cherry currant in size.

The strawberry yield was very light. The behavior of this delicious fruit was

most unaccountable. Every reason has been assigned for its capriciousness. The long, dry fall undoubtedly weakened the plant growth; and dry weather in the spring, when rain was most needed, followed by severe, late frost, and that succeeded by too much rain, wound up the crop. Those who realized the most out of the strawberry this season were those having staminate varieties. A few old Crescent beds, fertilized with Chas. Downing or Downer's Prolific, did so well that the Crescent will forge to the front again next year in spite of Brother Smith's attempts to drive it out of the market. This year we could have sold a soft berry, or anything, in fact, that could be palmed off on the guileless public as a strawberry. And, as money is what we all want, the berry that brings it will be planted, be it Crescent or Robinson. One of our growers had several acres of Gandy, and was the envy of his fellows. His fruit was fine, and a fair crop.

Of several varieties—viz.: Bubach, Glendale, Captain Jack, Jesse, Warfield, Mt. Vernon, Gandy, and Windsor Chief—Warfield took the lead. There were fewer imperfect berries after the first picking. It was the only one which made us any money. I hereby take back all the nice things I have said about Bubach; it is not a berry for profit. Captain Jack has ceased to do well in this section.

E. W. Cruse, one of our growers, has originated a variety which he calls "Aroma," which is certainly a very promising berry. It is a large, regular-shaped berry; bright, handsome color, and very firm. Being a perfect-flowering variety is a point in its favor. I visited the plantation some 10 days after the first picking, and found still an abundance of green and ripe fruit on the vines, and the fewest imperfect specimens I had seen. Mr. Cruse said that the bed had received only ordinary cultivation, which was evident in the appearance of the ground, and I believed him. Some of our growers will try Parker Earl and Beder Wood next year, and see if our Iowa friend's judgment is to be depended on.

Where, oh where, is the raspberry? With us, this once popular fruit is not "in it;" a very light crop, inferior in quality, will go down in the reports for 1893. The plantations that I saw were badly hurt by a fungus and by the Cane Borer, which has made its appearance. It seems to me our genial Secretary is rather selfish in keeping his seedlings so long out of the market. I never saw finer, larger raspberries than on his seedlings this season. Stand up, Mr. Brackett, and answer for yourself. Such selfishness is unbecoming to a horticulturist.

Everybody, with but few exceptions, predicted that the blackberry crop would be enormous, and low prices rule. We ourselves, in the beginning of the season, felt tempted to mow off the canes; they looked so sickly, and were so long leaving out; but, as the season advanced, the plantation looked better, and we began to count on half a crop, in which we were sustained by some of our neighbors who had been watching their plantations. The result justified our judgment, as no more than half a crop was realized by anyone, and in some places the crop was almost a failure. The Snyder is the only blackberry for profit with us. An insect of some kind worked on the canes in this vicinity. Its actions were much like the Cane Borer. The dewberry is not planted here, and the tree blackberry has not yet put in an appearance.

Grapes were a paying crop this year, and yielded well. Taking it all in all, the fruit grower who lives within his income, and keeps out of debt, is as well off as the rest of toiling humanity, and, whether gold or silver is the medium of circulation his fruit will circulate just the same.

Every year the public demands more and more, and, if he could just "bank" on the weather, I know no more surer investment for one who likes to deal in "futures."

# SMALL FRUITS.

BY B. F. SMITH, OF LAWRENCE.

Owing to the shortage last year in all kinds of fruits, we anticipated that this would be a great fruit season, but the strawberry product fell far short of last year's crop, and the quality was poorer than any season in our recollection. The berry patches in my county came through winter generally in good condition. The destruction that followed was not expected to come upon us two years in succession. Under all circumstances, some varieties yielded better crops than others. Among the older sorts, the first in product this season was Warfield; second, Captain Jack and Crescent. Glendale and Windsor Chief, Bubach, Jessie, Miner, Downing, Jumbo, Michel, Jersey Queen, Parry and others produced a few very poor berries. Among the newer kinds on our grounds, Robinson, Parker Earl and Beder Wood did best. Edward's Favorite was a disappointment. However well it may do in Colorado, its home, I have but little faith in its success on Kansas soil. In seasons past, we have had abundant crops of Miner, Downing, Haverland, May King, and others. Hence we should not discard them, as the climate next year may be conducive to a larger product and more perfect fruit.

We have on trial from 15 to 20 new and not widely-tested varieties, including Van Deman, Muskingum, Timbrell, Greenville, Princess, Australia Seedling, Columbus, Princeton, Epping, and others. Among the most promising this fall in plant growth are Muskingum, Columbus, Epping, Australian, Timbrell, Princeton, and Princess. The feeblest grower of the new candidates is the Greenville, an Ohio strawberry. The strongest grower is the Epping, a New Hampshire seedling.

The older strawberry fields did about all the fruiting in Douglas county. Had we not carried some of our old patches over to this year, our crop would have been very insignificant. It rarely turns out thus, but this appears to have been the case all over the West. Now we have turned over nearly all our old berry patches, and if our new ones should do no better next year than in 1898, we will fail in getting a crop.

While our strawberry crop was unsatisfactory, the raspberry product was but very little better. Nemaha, Gregg and McCormick turned out about half the usual product. The Souhegan did not do as well as the Nemaha and Gregg.

Progress and Kansas, both early new varieties, did best of any of the blackcaps on our grounds. Kansas leads the Progress in size of berry, but, aside from the size of Kansas berries, the Progress is its equal. We place Progress far ahead of Souhegan in product and hardiness of its canes. Queen of the West, a new variety, of Douglas county origin, is coming into favor.

The Thwack and old Turner were our best red sorts this year. The Cuthbert was seriously damaged by freezing.

Among the blackberries, Snyder and Taylor still lead in the field. Stone's Hardy is indeed hardy, but its fruit, while abundant, is too small. Erie is a fine berry, but Snyder or Taylor will double it in product.

Our hot summer seasons are detrimental to currant culture, unless it is done on the north side of a stone wall or board fence, or steep northern slope.

While gooseberries should always be grown to complete the home fruit garden, it would not be a profitable venture to plant many acres at the prices they sell for in our western markets.

Now, we have not considered the matter of cultivation in this report, assuming that most of our fruit-growing friends are fairly posted along the line of soil preparation, cultivation, etc. Would say, however, that we practice the same methods in selection of soil, preparing it for the plants, setting them out the same distance



apart, that we have been doing for 15 years. As to cultivation, we keep the hoe and cultivator moving among the new fields till after the middle of September. The same rule will apply to the raspberry and blackberry fields.

For several years we have read in the papers how thoroughly old berry fields have been cleaned up by applying a match to the strawberry patch as soon as the berries were picked; then how well old plants grew up and covered the ground, like a newly-planted field. While this kind of culture may do in Michigan or northern Indiana or Ohio, it will not do in Kansas. We tried it this season, in a small way, for experiment, and we lost a patch of two acres. Two or three weeks of dry weather followed the burning, and the buds of plants were likewise damaged by fire, so they never showed life enough to do any good. So we plowed up the patch. It is a good plan to mow off the berry field, then rake up all the leaves and straw together and burn them in the roadway spaces. By so doing, many injurious insects may be destroyed.

The lessons of the past two years suggest that fruit growers should not depend on fruit crops alone, as some of us have done in past times. If we would be successful fruit cultivators, we should first raise enough bread, meat and butter products for our own use, and then consider the amount of acreage we can manage, varieties of fruits to plant, and the markets we grow the fruit for, and the bearing that other fruit-growing localities and markets may have on our market. There has been much time, labor and waste of money in growing great fields of strawberries and raspberries with a view to making a small fortune out of a crop or two. The growth of great fields of any one kind of product is too expensive, when there are so many possibilities of disaster and uncertainty in climatic changes, or overproduction and no markets. Hence, we must diversify our crops, and change our methods to suit the times and the demand for our products.

#### SUMMARY OF DISCUSSION.

Currants must be protected from the hot sun, to make profitable crops. The protection can be made of lath, or other cheap material.

Gooseberries can be made profitable. The bush is easily grown, and is productive. The Houghton is the best sort. It is hardy. It thrives best on a stiff clay soil. This season, \$2.50 was paid for 24 quart crates, in the Kansas City market.

The next in order was read a paper on

#### RASPBERRY RUST (ANTHACNOSE).

BY G. C. BRACKETT, OF LAWRENCE.

This fungous disease is becoming more wide spread than most of our planters are aware of, and, when once established in a plantation, will, sooner or later, according to the conditions of weather, become its ruin. The spores of the fungus causing the disease continue over from year to year on the dead leaves and upon the canes, and with each returning spring are ready to innumeraably multiply.

Its weakening effects are annually marked in the plants, and are often attributed to sunburn, droughts, and short life, and by some to exhaustion from overbearing. There is no good reason why a raspberry plantation may not be continued in good health until 10 or 12 years old, and be profitably productive, excepting under a continued and severe drought. In the earlier days of Kansas, plantations have been thus continued, but it was before the introduction of this fungus.

The past season I have quite successfully controlled it, by spraying with sulphate of copper and Bordeaux mixture. The first application was made in the spring, before the leaf buds had opened; second, just before the fruit buds opened; third, after

blooming; and fourth, when they were the size of a common pea. The first was with sulphate of copper. Formula: One pound of sulphate dissolved in 10 gallons of water. If the water is hot, the dissolving will be very much hastened. All subsequent applications were of Bordeaux mixture, reduced form. Formula: One pound of sulphate of copper, one pound of quicklime, 22 gallons of water. All the applications were directed upon the newly-forming canes, excepting the first, which was upon the old canes, which were carrying the "resting spores" from the previous year's development. It must be borne in mind that these sprayings were not to kill the fungus, but to produce a protection of the plant from their successful attack; and that the finer the spray and the more thoroughly it is applied the more secure will be the protection.

Bordeaux mixture, reduced form: One pound of sulphate, one pound of quicklime, 22 gallons of water. Pulverize the sulphate, and dissolve in two gallons of hot water. Dilute this with 14 gallons of water. Slake the lime with six gallons of water, adding the water slowly and stirring to a smooth paste. Allow this to stand a short time, then stir it, and pour it slowly into the sulphate of copper solution, stirring rapidly during the operation. Never pour in any of the coarser sediment, which settles readily to the bottom. The mixture should be made fresh for each application, in order to secure the best results.

### VINEYARDS.

BY J. W. WILLIAMS, OF HOLTON.

The vineyards of Kansas, so far as your committee has seen, and had reports from through the press, are, as a general thing, in a healthy condition.

The long drought of the fall of 1892, or some few days of severe cold weather of the past winter, or both these combined, was the cause of some of the vines being slow in putting out leaves and blossoms in the spring of 1893. Many of the vines that seemed to be dead when the more healthy ones were in full leaf and the fruit buds were beginning to show blossoms began finally to show some vitality, putting forth weakly leaves and a few fruit buds. The fine growing weather, though, of the spring and early summer seemed to entirely recuperate them, and when the growing season was over there seemed to be little, if any, difference between them and their more vigorous neighbors of the early spring. Mildew and rot were not found in the vineyards in the year 1893, and the vintage was large; and in the failure of the apple crop and a light peach crop, the grape was much sought after, and sold for remunerative prices; the abundant crop, though, was sufficient to keep the price in reach of everybody.

The varieties that fruited the heaviest were in the order named: Lady Washington, Concord, Worden, Champion, Wyoming Red, Moore's Early, and Pocklington.

There has been but little attention given to spraying vineyards, for the purpose of preventing mildew and rot, so far as has come under my observation.

Among the new varieties introduced lately, Moore's Early seems to take the lead; this, in particular, for its earliness and fine appearance. The Worden is much sought after, being in appearance so much like the old reliable Concord. Having given some attention to the new varieties introduced in the past few years, I am unable to find any that has or will, in my judgment, come up to the standard of the Concord. It seems to be "the grape for the million."

### NURSERY STOCK.

U. B. PEARSBALL, Fort Scott: The season of 1893 has been favorable to the growth of nursery stock, which is, in my opinion, in very good condition. Prices have been fairly satisfactory. Some growers have made a success in cherry growing. Nursery

stock can be grown in Kansas as well as in any part of the United States. Bordeaux mixture when applied to the foliage of cherry trees will keep it green much later, and give a larger and better tree. Begin about May 1 with the spraying, and repeat every two weeks.

A. WILLIS, Ottawa: Cherry trees grown on the Morello stock are fruitful. But planters will not buy them, because of their sprouting from the roots.

U. B. PEARSALL, Fort Scott: French crab-apple seed is used, and preferred to the common apple seed, because more certain to germinate, and the stock grown from it is more hardy.

F. HOLSINGER, Rosedale: I like the Mahaleb best for a stock on which to work the cherry. Apple grafts should be planted deep enough to leave only one bud on the cion above ground. The principal roots will then form from the cion, and eventually take the place of those formed by the seedling stock used. Then we have a tree on its own roots, and, after two or three years, the influence of the grafted root on the tree will cease.

This was concurred in by Messrs. Cecil, Dixon and others in the meeting.

On motion, the session here adjourned to 1:30 o'clock P. M.

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## AFTERNOON SESSION.

WEDNESDAY, December 6, 1893.

The session was called to order, and the President read a telegraphic message of greeting from the Missouri Horticultural Society then in session at Fulton.

On motion, the President was instructed to respond in behalf of the Society.

## TIME OF HOLDING THE ANNUAL MEETING IN 1894.

On motion of Col. U. B. Pearsall, it was voted to hold the annual meeting in 1894 on the second Tuesday in December.

Next was the report of the superintendent of the Kansas fruit exhibit at the World's Columbian Exposition, in 1893.

## KANSAS FRUIT EXHIBIT AT THE WORLD'S FAIR—1893.

BY HON. F. WELLHOUSE, SUPERINTENDENT.

Soon after the passage of the World's Fair bill, and after the present board of World's Fair managers for Kansas had been appointed and organized, I was notified that they desired a consultation in regard to the fruit display to be made at Chicago, and I attended their meeting. The result of this conference was, that \$4,000 was set aside for this purpose, and the entire charge of said fruit display placed in my hands, as the representative of the Kansas State Horticultural Society; or, in other words, I was made superintendent of the fruit department.

In the month of April, I received a telegram from Hon. M. W. Cobun, president of the board of managers, to come to Chicago at once. I complied with this request, and found that Mr. Samuels, chief of horticulture, desired to consult in regard to filling the space previously assigned to Kansas in the horticultural building. This space consisted of two blocks in the north wing, of 120 square feet each of floor surface, or two blocks 10 by 12 feet each. We were allowed to fill these two blocks with canned goods, seeds, vegetables, or jellies. We had also secured a space 41 feet long and 14 feet wide in the pomological department, which was to be filled with fruit.

Mr. Samuels wanted all these spaces occupied, and wanted them filled at once, before the fair opened. Of course, we had no fruit at that time, and I so informed Mr. Samuels. It was finally arranged that we were to build our tables in the pomological department, and Mr. Samuels would get some of the other states to fill them until our fruits were grown, and then we were to occupy them.

The two blocks in the north wing I agreed to fill at once, expecting that our canning establishments would be glad to avail themselves of this opportunity to advertise their goods. I came home and visited all the factories I could hear of, but they had all sold off their goods so close that they had none to spare for this purpose. Messrs. Barteldes & Co., a large seed house, of Lawrence, Kas., agreed to fill one of these blocks, and did so with a very fine collection of seeds. The other block was filled with a splendid collection of jellies, made by the ladies of Kansas. These jellies attracted a great deal of attention, and were not excelled by any on exhibition. The jelly display was in charge of Mrs. A. M. Clark, one of the board of managers.

The latter part of June I received notice from the Kansas board of managers that they were likely to run short of funds, and that it would be necessary to cut down the amount set aside for the horticultural display. I immediately went to Chicago, and found that they had cut it down to one-half of the amount originally agreed upon. This was a serious matter. Many of the states were erecting pavilions, in which to display their fruits that cost more than the entire amount set aside for our display. I notified the board that we could not make a creditable display with that amount, and that I would have to refer the matter back to the State Horticultural Society for further instructions. I wrote to Secretary Brackett, informing him of the situation, and asking that he consult the officers of the Society, and inform me whether to go on or stop. He did so, and the result was, that all the officers except the Treasurer advised me to go ahead and make the best showing I could, or at least to proceed as long as the funds held out, also stating that we would probably never have another such opportunity to show our products, and the want of means must not interfere.

Our Treasurer wrote that, considering the condition of the fruit in Kansas, and the lack of means, he thought it best not to try to make a display. This almost unanimous expression from the officers of the Society was sufficient instructions for me to push forward.

The first thing done was to establish headquarters. Messrs. Ryan & Richardson, of Leavenworth, who own the largest cold-storage plant in the state, offered us space in their building, free of cost, in which to store our fruit before shipping to Chicago. We gladly availed ourselves of this kind offer, and made our headquarters in their building.

Secretary Brackett then issued the following circular:

DEAR SIR: The state board of managers for the World's Columbian Exposition have placed the state fruit exhibit in charge of the State Horticultural Society, under the superintendency of Judge F. Wellhouse, and this circular is sent to solicit your coöperation in the work of collecting and forwarding to him, at Leavenworth, the finest product of the orchards and vineyards of your county.

Undoubtedly you fully realize the importance, at this time, of sustaining the high reputation which has been accorded to the state in years past as a most favorable fruit region in the West, and which has added thousands of intelligent fruit culturists to her population, and materially increased her wealth, which has been the result of exhibiting her fruits in the past at home and abroad.

The opportunity offered to exhibit the product of the resources of Kansas at the world's exhibition, and before the thousands of homeseekers, vastly surpasses any occasion offered heretofore, and should not be treated with any degree of indifference or neglect by any class of our citizens.

Trusting a favorable and prompt response, I am,

Yours sincerely,

G. C. BRACKETT, *Secretary.*

About 1,000 of these were mailed to the fruit men of the state. I then visited

Johnson, Wyandotte, Franklin, Anderson, Allen, Neosho, Wilson, Montgomery, Chautauqua, Cowley, Butler, Greenwood, Lyon, Osage, Shawnee, Douglas, Leavenworth, Atchison, Doniphan, Brown, Jackson, Jefferson, Wabaunsee, Morris, Marion, Chase, Harvey, Pottawatomie, Riley, Geary and Dickinson counties. My purpose in going to these counties was to locate the fruit that would do for exhibition, and I am compelled to say that the outlook was very discouraging.

I found an abundance of grapes everywhere, a fair showing of peaches, some good pears in a few localities, but the great staple fruit of our state, the apple, was woefully scarce and defective, but I found some few in the northeastern part of the state that would do to put on the tables; and having now ascertained the localities where the best fruits could be procured, the next step was to secure the best men we could find to gather it in. After several consultations with Secretary Brackett and other members of our Society, the following names were agreed upon: For Douglas county, Samuel Reynolds and B. F. Smith; Leavenworth county, E. J. Holman; Wyandotte county, Maj. F. Holsinger; Johnson county, E. P. Diehl; Shawnee county, J. F. Cecil and W. T. Jackson; Jefferson county, H. R. Roberts; Jackson county, J. W. Williams; Brown county, F. W. Dixon; Atchison county, T. F. Cook; Doniphan county, J. E. Campbell; Riley, Geary and Dickinson counties, William Cutter and J. H. Cutter.

All these gentlemen, except T. F. Cook, E. P. Diehl, and Major Holsinger, took hold with a determination to do their part in making the exhibition a success. Mr. Cook wrote me that he would be glad to help, but could not spare the time. Major Holsinger did not think it worth while to answer my letter. Capt. E. P. Diehl wrote me that there was no fruit in Johnson county fit for exhibition that he knew of.

We notified our men that we desired to ship to Chicago the last of August, and they made extra efforts to get in all they could by that time. The last three days of August, Secretary Brackett and William Cutter came to Leavenworth and helped us resort, repack and label the varieties, and when we were through we had 25 barrels of apples, 25 boxes of apples, pears, peaches, and grapes, and 70 baskets of grapes and peaches. These we shipped in a Santa Fé refrigerator car on September 1, and they arrived in Chicago the next day, but we could not get them over to the fair grounds until the 8th, just one week after shipping. After that we had all our shipments made by express, and they arrived on time, in good condition.

Wm. Cutter went to Chicago and helped open up the fruits and put them on the tables. He spent about two weeks at this work, and bore his own expenses to and from Chicago, and while there. Secretary Brackett and ex-Pres. G. Y. Johnson came over before our work was completed, and helped finish it up. They each spent about one week helping, without pay.

We made two exhibits: one in the Kansas building, the other in the horticultural building. That in the horticultural building was entered for competition, and consisted of 539 plates of apples, 40 of pears, 105 of grapes, and 36 of peaches, embracing the following varieties:

*Apples.*—McAfee, Kansas Keeper, Sweet Pippin, Michael Henry Pippin, Bachelor Blush, Golden Beauty, Fink, Lackford Seedling, Pewaukee, Pryor's Red, Tewksberry, Porter, Dominic, Lansingberg, Fallawater, Melon, Detroit Red, Roman Stem, Early Strawberry, Baldwin, White Winter Pearmain, American Summer, Jonathan, Flora, Cooper's Early, Missouri Pippin, Gramar's Pearmain, Benoni, Grimes's Golden, Holton, Willow Twig, Maiden's Blush, Gilpin, Stark, Ben Davis, Woodbridge, Alexander, Chenango, Clyde Beauty, Roxbury Russet, Pennook, Rome Beauty, Huntsman, St. Lawrence, Rambo, Yellow Bellflower, Pound Sweet, Hubbardston, Rhode Island Greening, Oldenburg, Early Pennook, Smokehouse, American Golden Russet, Smith's Cider, Wagener, Schemmerhorn, Fameuse, Tompkins King, Trenton Early, Autumn

Swaar, Twenty Ounce, Vandevere, Bailey's Sweet, Gloria Mundi, Jefferis, Hoop, Swaar, Kaighn's Spitzenberg, May, Buckingham, Stannard, Cole Quince, Wine, Mother, White Pippin, Lowell, Winesap, Wealthy, Westfield Seek-no-further, Newtown Pippin, Northern Spy, Bonum, Soulard, Transcendent, Hyslop, Wild Crab, Marengo. Total, 88 varieties.

*Pears*.—Kieffer, Bartlett, Angouleme, Howell, Benfield, Buffum, Clairgeau, Vicar, Flemish Beauty, Louise Bonne de Jersey, Seckel, Sheldon, Anjou, Le Conte, Mikado, Unknown. Total, 15 varieties.

*Peaches*.—Elberte, Heath Free, President Fairchild, Stump the World, Snow, Old Mixon Cling, Old Mixon Free, Morris White, Ward's Late, Hoppin's Free, Newington Cling, Smock, Large Serrate York, William's Favorite, Early York. Total, 16 varieties.

*Plums*.—Bluemont, Miner. Total, 2 varieties.

*Grapes*.—Moyer, Eaton, Faith, Carman, Cambridge, Whitehall, Irving, Merrimac, Ives, Josselyn's No. 10, Draout Amber, Lady Washington, Massasoit, Conqueror, Luta, Green Mountain, Josselyn's No. 7, Iowa Excelsior, Wilder, Jessica, Eumelan, Eldorado, Cottage, Centennial, Brant, Barry, Bacchus, Amber Queen, Worden, Beauty, Goethe, Iona, Herbert, Hayes, Hartford, Beagle, Bell, Brilliant, Blood, Eva, Creveling, Early Victor, Duchess, Telegraph, Niagara, Naomi, Moore's Diamond, Maxatawny, Van Deman, Golden Coin, Martha, Marion, Lindley, Lenoir, Lady, Wyoming Red, Humboldt, Doaniana, Prentiss, Poughkeepsie, New Haven, Perkins, Red Eagle, Ruby, Rommel, Pearl, Norton's Virginia, Noah, Concord, Missouri Reisling, Agawam, Delaware, Elvira. Total, 73 varieties.

The following is a list of contributors:

*Jackson County*, through J. W. Williams: J. W. Williams, Dan. Miller, Mr. Stark, A. Peace, John Bottom, Wm. Rings, Mr. Shields, J. F. Pomroy, John Carpenter, L. Stephenson, Mr. Copeland, H. Tucker, J. Finley, John Dixon, Jacob Hixon, and W. B. Talbert. Through F. W. Dixon: J. H. Johnson, Geo. Hover, J. W. Odin, C. C. Hart, John Shrup, Henry Hand, J. Dykeman, W. L. Stackhouse, P. Gruver, Jacob Kern, jr., E. N. Ball, C. R. Fleming, J. S. Daud, A. J. Beamer, O. E. Eames.

*Brown County*, through F. W. Dixon: John A. Davidson, John Whiehie, John McCoy, F. S. Dixon, Henry Isley, W. W. Fish, L. Gilmore, Jacob Shaner, L. V. Paston, W. D. Frazey.

*Leavenworth County*, through E. J. Holman: Henry Irwin, Thos. Jameson, Wm. Prather, Harry Wood, T. Trackwell, Jos. Thiebaut, Chas. Ott, G. W. Seymour, Chris. Rodenburg, Fred. Thies, Wm. Conway, Henry Ode, J. C. Baird, C. C. Myers, J. F. Taylor, O. Markham, Mrs. L. L. Terwilliger, E. J. Holman, Wheat & Wellhouse.

*Jefferson County*, through H. R. Roberts: W. B. Rose, P. Hackett, Harry Lopp, Thos. White, H. Bettys, D. Vilas, Mrs. Sprote, H. Raines, L. Fisher, Mrs. Byers, Carl Richster, John Saylor, Jesse Britton, B. Bradford, Milton Jones, Geo. Klinger, M. H. Smith, Jack Bryant, Jasper Wilson, R. D. Vermillion, Jesse Kirkham, Mr. David, Mrs. Beason, M. Gray, M. B. Corle, R. Myers, T. White, Jos. White, T. Fitzpatrick, R. M. McClure.

*Douglas County*, through Samuel Reynolds and B. F. Smith: John Scott, Thad. Whedon, Chas. Gaumer, John Brown, B. F. Smith, Wm. Duncan, Henry Fiehler, Julia Fiehler, M. Merchant, Mrs. L. Hays, Job Robinson, John Jenkins, Lewis Tucker, Chas. Hale, W. R. Hale, James Hale, Henry Copp, Wm. Kennedy, Mrs. M. Perkins, John Moody, John Suiter, Wm. Hughs, sr., Wm. Hughs, jr., A. H. Griesa, Jas. Kane, P. Voorhees, L. VanVoorhis, H. Winney, Samuel Reynolds, W. H. Laptad, J. W. Hendry, W. Howard, John Gilman, Henry Schlagel, P. Carter, S. J. Sherry, John Garvin, H. S. Fillmore, Thos. McFarland, John Wilson, W. R. Finney, Mrs. M. Armstrong, P. P. Phillips, H. S. Smith, S. E. Osborn, C. L. Pease, E. A. Holloway, Frank E. Wheeler,

J. C. Bare, Wm. Jordan, Clark Reynolds, E. W. Flory, W. R. Williams, Mrs. M. Moaks, Jas. Russell, J. F. Williams, John Irwin, Jasper Wilson, T. R. Bayne, J. P. Kinkle, Dr. A. Newman, Howard Roberts (Jefferson county).

*Shawnee County*, through W. T. Jackson: S. E. Grimes, J. W. Rugel, J. A. Baxter, J. G. Clark, F. M. Stahl, W. D. Mendenhall, Nathan Brobst, A. C. Buckman, Thos. Buckman, John Sims, Mr. Holloway. Through J. F. Cecil: J. Browning, Mrs. P. J. Gilman, J. Bridgeman, J. M. Priddy, B. F. Van Orsdal, Geo. Asherman, B. F. Van Horn, A. Gordon, P. Duffy, J. Weiss & Co., C. Hanrahan, Robt. Jackson, John Howerton, Chas. Howerton, Martin Hess, John Allen, J. T. Short, Wm. Bond, E. T. James, J. H. Badger.

*The State Agricultural College* contributed 80 varieties of grapes.

A. P. Collins, Saline county, furnished a nice lot of fruit, but failed to send a list of the donors.

We regret to say that this is not a full list of the contributors. We were not able to get the names of all the persons who aided us.

Our tables in horticultural building were six receding elevated shelves, on each side of the aisle, 41 feet in length. These shelves were painted white, and had no other covering. Pavilions, considering the state of our finances, were not to be thought of; and it is a question whether pavilions added any to the attractions of the fruit display. At any rate, they were sour grapes to us. The fair association furnished plates.

Our tables in Kansas building were common flat ones, neatly made, stained, and varnished, seven feet long and 2½ feet wide. We filled 17 of these with fruit, duplicating that in the horticultural building; but it was not entered in the competition list. We used paper plates for this display, and no covering on the tables.

After both of these displays were put upon the tables we had nine barrels of apples and a few pears and grapes left as a reserve. About this time John Armstrong, of Topeka, fearing we would run short, gathered up two barrels of the finest fruit he could find, paid the express charges, and came to the fair with it. As soon as we could secure tables it was opened out. About the same time several other packages came in, so that we were in condition to weed out all the defective and decayed specimens and replace with good fruit; this we did every day from the time the fruit was put upon the tables until the close of the fair. Our peaches were in bad condition when put on exhibition, and in less than a week we had to remove them and fill their places with apples. The grapes held out better, but they too had to soon be removed, and the space filled with apples also; so, by the first of October, we were showing but little else than apples, but these we were improving constantly. About this time John Cutter sent us four barrels of splendid winter varieties, well colored, which would have been considered fine any year, and H. R. Roberts sent us three barrels equally as fine, but not so large. These two collections carried us through till the close of the fair, and enabled us to improve our display every day.

The immense crowds of people created so much dust that, in order to keep our fruit in presentable shape, it was necessary to rub and clean the fruit, plates and tables every day. The board of managers furnished us help to do this.

We were intending to show by counties, but there was so much sorting and resorting to do that we found this impracticable; we often had to look over the collection from three or four counties to get a single creditable plate of some varieties. We also intended to put the fruit grower's or owner's name on each plate, but for the same reason this could not be done.

We received from different persons the number of plates of fruit set opposite to their names: Wm. & J. H. Cutter, 1,140; Reynolds and Smith, 998; Geo. Richardson, 620; E. J. Holman, 410; J. E. Campbell, 310; H. R. Roberts, 830; Mr. Rose, 170; F.

W. Dixon, 580; J. W. Williams, 320; J. F. Cecil, 568; W. T. Jackson, 610; John Armstrong, 180; State Agricultural College, 82; Coffey county, 162; Wabunsee county, 82; Pottawatomie county, 78; Morris county, 54; Saline county, 282; Marion county, 36.

The mode of awarding premiums in the pomological department was as follows: Ten points were established: Dessert, kitchen, market, size, color, uniformity, freedom from insects, freedom from other blemishes, handling, perpetuation; so that, when a plate of fruit is perfect, it counts 100, or 10 for each point. When the fruit is put on the tables and the entries made, the judges examine it and establish its grade in all the points named except perpetuation, and they then look over it daily to see whether this standard is kept up. At the close of the fair, the grade for perpetuation is established, and the final grade of each display is summed up, and each one gets an award in proportion to its merits.

Our competitors were: Arkansas, Nebraska, Oregon, Colorado, Missouri, Washington, Montana, New Mexico, Idaho, Canada, Wisconsin, Kentucky, California, Illinois, Iowa, Minnesota, Michigan, New York, and New Jersey.

At the close, on motion of Samuel Reynolds, the thanks of the Society were voted to the superintendent for his great success of the exhibit under such unfavorable circumstances.

### METEOROLOGY.

BY T. B. JENNINGS, DIRECTOR OF STATION OF TOPEKA.

The crop season of 1898 opened with unfavorable conditions. A general drought had prevailed for over six months, and was still in force. During the month of May this drought was broken in the extreme eastern counties, was considerably reduced in the central counties, but was still in force in the western.

Low temperature prevailed during the last half of April, which, following the exceedingly high temperature of the first week, was very unfavorable. General frosts over the state, and hailstorms in the eastern half, early in May, did some damage to fruits of all kinds. However, the second week in May was quite favorable, but during the following week the prospect was diminished by much falling of young fruit.

Low temperature and cloudy weather during the last half of May and first week in June acted unfavorably, and we find the fruit crop still getting lighter. More favorable conditions the next two weeks improved matters materially, but, by the 17th of June, grapes commenced to rot in Labette. Good rains the last of June and warm weather the first of July improved the outlook, but it was then too late to materially increase the crops.

Dry weather through August and September acted as a winter to the fruit trees, and the rains of the last week in September, followed by the warm weather of October, proved a spring, and many apple trees bloomed in the latter part of October, though generally such as had not borne fruit during the season, or had produced it in very limited quantities.

With the exception of a crab, trees in my orchard that bloomed in October exhibited the bloom on the southeast branches only. These trees were leafless at the time. The crab had a good supply of leaves from the season's growth, and it showed no partiality in the distribution of its blossoms.

### EVERGREENS.

BY G. W. BAILEY, WELLINGTON.

"A thing of beauty is a joy forever." Such a thing, to my mind, is a red cedar properly handled, for on the handling or pruning depends entirely the future form of this queen among evergreens. This beautiful tree, [*Juniperus Virginiana*,] or red



cedar, grows through; Clark Reynolds, E. W. Flory, W. R. Williams, M. ... as, John Irwin, Jasper Wilson, T. R. Bayne, J. P. ... (Jefferson county).  
grows the better the wood. W. T. Jackson: S. E. Grimes, J. W. Rugel, ...  
ceeds 40 or 50 feet, with a Mendenhall, Nathan Brobst, A. C. Buck ...  
the ground up. The wood is ... Through J. F. Cecil: J. Browning ...  
posts. The tree varies greatly ... B. F. Van Orsdal, Geo. Asherman, B. F. ...  
12 feet high the branches are often ... Hanrahan, Robt. Jackson, John ...  
in 1873, west of Medicine Lodge river ... J. T. Short, Wm. Bond, E. T. Ja ...  
posed were 50 to 75 feet in height, and ...

Now, as these beautiful trees grow naturally in varieties of grapes. ... whether in country, city, or village, should, ... of fruit, but failed to send ... them. In the spring of 1873 I set out four ...  
They were taken from the cañons out west, and ... contributors. We were no ...  
They have grown right along, with no special care, except ...  
desired—the form of a cone. The largest is six or seven ...  
over 20 feet in height.

In the spring of 1875, I planted one pound of red cedar ... and white, and had ... cents; they were planted in a peach orchard. The second year ... were not to ...  
they came up, and were hoed occasionally each season. In the spring ... attractions of ...  
a sharp spade, the roots on each side of the rows were cut off as deep ... association ...  
could be forced into the ground, about eight inches from the plants. ...  
this was to cause fibrous roots to grow where the old roots were cut. This ...  
in good shape for transplanting, which was done the following spring, 1876 ...  
up as much dirt with the roots as possible.

The same plan holds good with all kinds of evergreens. Handled this way ... is very seldom that any fail to grow. These trees of mine are a nice shape ...  
branches from the ground up, from 8 to 16 feet high. I am giving them a variety ...  
of forms. As already indicated, this is done by pruning, commencing when the tree ...  
is small. A sharp pruning knife is used, making a quick, sweeping cut upwards, ...  
the outer ends of the branches. As the trees get larger, a corn knife is used instead ...  
of the pruning knife. Two or three times during the season the trees are thus ...  
pruned. This serves two purposes, making the tree the shape desired and causing ...  
the growth of the trunk to go upward instead of into long, straggling branches.

Next to the red cedar, in my judgment and experience, is the Scotch pine, this ...  
being one of the most rapid-growing species of pine, and it does well in a variety ...  
of soils. In its native forests, in Europe, it attains a height of 80 feet, and five or ...  
six feet in diameter. Here in southern Kansas it grows rapidly, and is easily trans- ...  
planted—two very important points for the tree planter's consideration, that should ...  
secure it a large space in every plantation. To show its readiness to grow under ...  
adverse circumstances, in the spring of 1878 I received six trees from a nursery in ...  
Wisconsin, by mail, without special care in packing, simply wrapped with ordinary ...  
paper, and sent as samples of what the nurseryman had to sell. They were set out ...  
with hardly the ordinary care, yet they all grew, and are now from 10 to 15 feet ...  
high. Like the cedar, but not so easily, they can be improved in form by pruning.

White pine, as an ornamental tree, is not surpassed by any of its species. Its ...  
foliage is soft, its color agreeable, and the form is symmetrical. While this tree is ...  
said to do well in all kinds of soil, except on land where water stands, and for orna- ...  
mental purposes is more beautiful than the Scotch pine, yet it does not bear trans- ...  
planting as well; at least this has been the experience in this part of Kansas.

The American arbor vitæ, for ornamental hedges, wind-breaks for stock and or- ...  
chards, is one of the best. It bears pruning to any extent desired, and when pruned ...  
close, making the tree compact and dense, it will retain the green, fresh color during

...not pruned closely. It is inclined to send up two or more  
...should be allowed to grow if a symmetrical tree is desired.  
...be made any shape desired. For a hedge, it should be set 12  
If for a hedge on each side of the path in the front yard to the  
...can be made square, V-shape, or inverted V-shape. My choice would  
...and each of the sides. This will make, at from six to eight years,  
...all four feet high and the same in width, if desired.  
...its are set 8 or 10 inches apart, and a few plants should be kept in  
...filling any vacancies that occur from failure to grow the first season  
...ing. For wind-breaks, either for stock or orchard, the rows should be  
...apart, the trees four feet apart in the row, setting the trees in each row  
...the space between the trees in the next. Six rows planted as above will in  
...are make a wind-break in both summer and winter that will be ornamental  
...as useful.  
...the Norway spruce, for wind-breaks or for ornamental purposes, is not excelled  
...ny tree grown in this part of Kansas. A well-grown tree, standing alone upon  
...wn, clothed with branches from the ground up, is, to all who admire the beauti-  
...in nature, an object of admiration. No other evergreen is more easily raised  
...om seed, no other is as cheaply obtained from nurseries, no other is more success-  
...ully transplanted. It is very hardy, of vigorous growth, branches and foliage dense  
and compact, and the tree does well in a variety of soils. For wind-breaks, plant  
the same as arbor vite, only farther apart.

#### REMARKS.

F. HOLSINGER, Rosedale: The sap of an evergreen is largely composed of a resi-  
nous matter, which, when dried, will not dissolve. Hence the roots of a tree should  
not be allowed to become dry by exposure to the air or sun. They must be kept  
moist from the moment they are dug from the ground until again planted, and when  
planted the ground must be well firmed about the roots.

#### EVENING SESSION.

WEDNESDAY, December 6, 1898.

The session was called to order at the hour designated on adjournment.  
The first exercise was a paper on

#### HOME ADORNMENT.

BY MRS. ELLA W. BROWN, HOLTON.

Emerson, in the beginning of his essay upon "Compensation," says that he had  
wanted to write upon the subject from his childhood; that the material lay all about  
him—in the workshop, on the street—the tools in hand; and even the dinner in the  
kitchens taught the law of compensation.

So, I wish that some philosopher might write with equal power upon the subject  
of "Home Adornment," for here, too, the materials lie all around us.

In the prelude to Whittier's "Among the Hills" is given a description of homes  
whose counterpart, alas, may be found without looking across a lapse of half a cen-  
tury. Even here and now, on these broad, beautiful prairies, and even in our airy,  
well-planned towns may sometimes be found—

"Old homesteads, where no flower  
Told that the spring had come, but evil weeds,

Nightshade and rough-leaved burdock in the place  
 Of the sweet doorway greeting of the rose;  
 And honeysuckle where the house walls seemed  
 Blistering in the sun, without a tree or vine  
 To cast the tremulous shadow of its leaves  
 Across the curtainless windows, from whose panes  
 Fluttered the signal rags of shiftlessness;  
 Within, the cluttered kitchen floor, unwashed  
 (Broom clean, I think they called it); the best room  
 Stifling with cellar damp, shut from the air  
 In hot midsummer; bookless, pictureless,  
 Save the inevitable sampler hung  
 Over the fireplace, or a mourning piece—  
 A green-haired woman, peony cheeked, beneath  
 Impossible willows; the wide-throated hearth  
 Bristling with pine boughs, half concealing  
 The piled-up rubbish at the chimney's back;  
 And, in sad keeping with all things about them,  
 Shrill, querulous women, sour and sullen men,  
 Untidy, loveless, old before their time,  
 With scarce a human interest save their own  
 Monotonous round of small economies,  
 Or the poor scandal of the neighborhood;  
 Blind to the beauty everywhere revealed,  
 Treading the mayflowers with regardless feet;  
 For them the song sparrow and the bobolink  
 Sang not, nor winds made music in the leaves;  
 For them in vain October's holocaust  
 Burned, gold and crimson, over all the hills,  
 The sacramental mystery of the woods.  
 Churchgoers, fearful of the unseen powers,  
 But grumbling over pulpit tax and pew rent,  
 Saving, as shrewd economists, their souls  
 And winter pork with the least possible outlay  
 Of salt and sanctity: in daily life  
 Showing as little actual comprehension  
 Of Christian charity and love and duty,  
 As if the sermon on the mount had been  
 Outdated like a last year's almanac:  
 Rich in broad woodlands, and in half-tilled fields,  
 And yet so pinched and bare and comfortless,  
 The veriest straggler, limping on his rounds,  
 The sun and air his sole inheritance,  
 Laughed at a poverty that paid its taxes,  
 And hugged his rags with self-complacency."

Unfortunately, such homes and their surroundings are not a lost type. There is a need for better homes and better home life. The real object of the home, as of all existence, is the development of character. That is a successful home adornment which subserves the end of the home. The foundation of all home adornment is cleanliness, for "cleanliness is next to godliness"—no good thing can come out of filth.

In the selection of ornaments for a home, this thought should be kept in mind: How much time, care and intelligence am I to sacrifice in order to have that piece of bric-a-brac to look at?

Look at some homes: tidies and throws; draperies, cushions, and (just now) pillows; and slumber robes and bags, and screens and holders, and articles innumerable whose real usefulness is almost nothing, yet whose care and arrangement take more time and labor by far than it does to keep the floor and windows of the room clean. These things are not useful, and, as a whole, they have no claim to being ornamental. It takes more than an artist's skill to get together such an array

of things and have them harmonize. And again, the total cost of these things would put upon the wall one good picture at least each year, or put on the bookshelves a set of good books, with time enough saved from care of trinkets to read them. Perhaps the great criticism on American womanhood is, that we have too many Marthas and not enough Marys; too many who are worn and nervous from the care of the house, and too few who have the leisure to be at home with self.

After the things necessary to the health and comfort of a family are in a house, only such other things should be added as will conduce to the cheerfulness, restfulness, peace and inspiration of its inmates. Anything that adds to the care of a house, without ministering either to the health, comfort, or æsthetic sense, is a useless burden.

If some edict could go forth that would give the women a respite from this endless slavery to fancy work; this tiresome making of "things;" this bondage to the crochet hook and the embroidery needle, and from the infatuation of paint tubes and brushes, and send them forth under the clear skies "in the love of nature, to hold communion with her visible forms," what a change it would work in our household life. Yes, and in our house surroundings too. A text comes to me at this moment with a new meaning: "Consider the lilies of the field, *how they grow*, they toil not neither do they spin; yet Solomon in all his glory was not arrayed like one of these." And it is possible for us to surround our homes, our humble lives, with a glory that surpasses Solomon's splendor.

The cultivation of plants, trees and shrubs brings a sweet and gentle influence into a life, and, if for no other reason than the spiritual culture it brings, it would be highly profitable employment. But it is also more profitable than other kinds of home adornment, because it is a thing that increases; that grows from year to year more valuable, instead of decreasing in value and finally being discarded as rubbish.

This contact with plants makes the sensitive soul find

"Tongues in trees, books in the running brooks,  
Sermons in stones, and good in everything."

This outdoor life attunes the soul to say, with Lowell:

"What so rare as a day in June!  
Then, if ever, come perfect days;  
Then heaven tries the earth, if it be in tune,  
And over it softly her warm ear lays.  
Whether we look or whether we listen  
We hear life murmur or see it glisten;  
Every clod feels a stir of might,  
An instinct within it that reaches and towers,  
And, groping blindly above it for light,  
Climbs to a soul in grass and flowers."

A house must have an appropriate setting. Simply a house cannot make a home; there must be an outlook, well-kept lawns, and, if in the country, well-kept fields, too; and, if it were only possible, well-kept roads. If the proper machinery is provided, a well-kept yard is easily within the power of the women folks of the family. It is easier to mow an ordinary sized yard with a lawn mower than it is to put the family washing on the line, and is much cleaner, pleasanter, life-giving work.

We need to economize on the labor that keeps us indoors, that we may have more of time out of doors. Less time indoors might possibly give us plainer living, for which we would be the better, and more time out of doors, spent in the care

of green, growing things, would surely conduce to higher thinking. Wordsworth, in his "Intimations of Immortality," says:

"To me the meanest flower that blows can give  
Thoughts that do often lie too deep for tears."

There is another substantial reason for the results of horticulture making the best home adornments, or, in other words, being most helpful to formation of noble character: while an apparently frescoed wall may prove to be papered; the solid silver may wear through to a steel foundation; the dainty lace curtains may wash into Nottingham; the comfortable appearing couch may be hard as a board; the pretty, big, downy-looking pillows may be stuffed with straw; the body Brussels may come up tapestry in the spring; the oil painting, under a strong light, may show up a chromo; the leather-bound book fuzz up; the walnut furniture scratch into ash; the Haviland china may craze; and the cut glass not be resonant, yet a plant, shrub and tree never pretend. They are genuine; they are honest; they are what they *appear* to be, if not what they were sold to be. The violet never pretends to be a pansy; it is always the same modest violet.

While practically, and it would almost seem of necessity, so much of our home surroundings tends to teach children that to *appear* is as good as *to be*, contact with nature's products will help to counteract this deplorable influence. There is gratification in watching growth that can never come from watching things wear out. There is a development of conscious strength in being a party to the improvement of a landscape. We were long ago shut out from that perfect Edenic garden — pilgrims. And yet —

"We pilgrims of the world go forth,  
Obedient to the word,  
And find, where'er we till the earth,  
A garden of the Lord.

"The thorn tree casts its evil fruit,  
And blushes with plum and pear,  
And seeded grass and trodden root  
Grow sweet beneath our care."

To sum up, it would appear that, for a foundation for home adornments, an absolute cleanliness within doors, and tidiness without, are essential for a basis; some yards that are an eyesore to the community could be made passable, and some even beautiful, if somebody would take a half day to pick and burn the rubbish thereon. When we have the basis for the adornment, the next principle, it appears, is, deal only in the genuine. If there is some spare money not needed for actual necessities, let it go this year into some article of real worth. If it is a piece of oak furniture, let it be oak; if it is a picture, let it be some one real work of art, instead of a half dozen daubs or imitations. I should rather a child would take through life a memory of only *one* picture in his childhood's home, if that were a good one, than walls crowded with things that had no artistic value. If it is a book, let it be a good author, good print and well bound, and selected with that care that you would bestow upon it were it the *only* book the children would ever have. If the principle of buying the genuine in the way of adornments is followed out year by year, after a while the homes would be sufficiently adorned, and that with articles of real merit; whereas, if each year we run after the latest thing in fancy work, the last sensational novel, and so on, our homes will be filled with rubbish. And —

"Such should not be the homesteads of a land  
Where whoso wisely wills and acts may dwell  
As king and lawgiver in broad-acred state,  
With beauty, art, taste, culture, books, to make  
His hour of leisure richer than a life  
Of fourscore to the barons of old time."

All adornment is of real value only as it contributes to the formation of character, to the development of the intellect, to soul culture; only as it makes more noble, generous and helpful men and women, and all things should help to this development, until we fully realize that mankind is more precious than the gold of Ophir, unto whom all things should minister as outward signs and types of the eternal beauty.

This was followed with an address on

## HORTICULTURE AS A BUSINESS.

BY HON. EDWIN TAYLOR, OF EDWARDSVILLE.

The dictionary defines horticulture as "the art of cultivating gardens." A garden, it says further, "is a piece of ground appropriated to the cultivation of plants, fruits, flowers, and vegetables." In its popular acceptance, the word "garden" means a small parcel of ground: but a garden need not be small. A piece of chalk may be the insignificant and inevitable occupant of the small boy's pocket, or it may be one of the frowning cliffs of Dover: a garden may be limited to the few vegetable beds of the villager, or it may be expanded into a plantation. Wherever the garden crops, fruits, flowers and vegetables are raised, there is a garden; and wherever a garden is cultivated, there is horticulture. Horticulture is pursued by an innumerable multitude of people—at a gait, however, in many cases, which insures that they will never get abreast of it. With some it is followed as a diversion; with others as an art; with others, again, as a gainful occupation or business. In each of these directions its possibilities are large; as a diversion they are preëminent. For a soul-satisfying avenue of enjoyment, one that will not clog or pall the appetite, there has been a world of affirmation that it is not excelled both before and since Lord Bacon passed his famous encomium upon it, that "God Almighty first planted a garden, and indeed it is the first of human pleasures." The culture of plants and flowers is unique among the arts, in this, that it is impossible to produce inharmonious combinations in it. If samples of every package in the seed store were by accident sown broadcast together, there would result a *potpourri* of flowers that all the town would go out to see. Nature would come to the rescue of the blunderer and put beauty into his floral medley. The painter or sculptor can go no farther than to depict life; the gardener creates it. The principle of life he does not create, but he presses the button, so to speak, which starts its tremendous and mysterious processes into operation. He puts into the damp, dark mould, as into a grave, the little, black flower seeds, diminutive, inert packages of starch, albumen, and what not, and presently, so potent is the necromancy he invokes, that, bursting their dead cements, they stand before his astonished and enraptured gaze a prefigurement of the resurrection, clothed in loveliness, mystic, wonderful, transformed with a magic that puts to shame the highest efforts of Hermann or Signor Blitz.

Into the business of horticulture such considerations do not enter, except as side issues. A typesetter may appreciate and enjoy the poem he is putting into type, but the gratification of his literary taste is no part of his craft. He sets type for a living, and something over, we will say. For the same reason the gardener runs his garden. He may gather gratification from his cares, but his first concern is profits. Æsthetic considerations are all right in their way, but they buy no frocks and pay no taxes, and lose their flavor somewhat where they are made the main course in one's daily fare. People have crossed the continent to see the royal gorge of the Arkansas, one of the grandest exhibits of the Rocky mountains, but the train men whose daily trips are through it knock off nothing from their wages because of the scenery on their run.

In the frequent wails over the defection of the boys from the farm, a prominent feature of the literature of the day, the idea is held out that financial motives are all right in other lines of life, but out of place on the farm, where the heyday of the plow, the radiant zest of driving the jocund team afield, the bucolic delights of flowing pail and honeybees, the Arcadian calm of country living, are held to be a full and sufficient offset to any per capita deficiency. To my mind this is a mistaken position, and the boys plainly agree with me, by the way they shake the dust of the paternal acres from their feet as soon as they reach their majority. If farming or gardening do n't pay, let us own it; or, when cornered, not resort to the subterfuge that while they do n't pay in currency they do pay in considerations of an uncurent kind. And if either of those callings does n't pay, while we may be too old or too stupid to undertake a new departure ourselves, let us recommend our sons to seek their fortunes where they may be found.

Business is business. It is the footing of the balance sheet that controls in business affairs. Horticulture and agriculture are both business, and horticulture will stand the commercial test: it pays. In making the comparison between it and other avocations, we must be fair. Horticulture would not be fairly measured by the standards of enterprises out of its class. Clipping coupons from government bonds is one of the most remunerative exercises on record for the amount of labor involved. It beats gardening out of sight. The hoe is not "in it" with the shears. The bankers of my acquaintance are more prosperous than the gardeners; but, in the first place, the requirements of banking are such that not many people can fill them; in the second, no industry can keep pace with the collection of usury. But put horticulture alongside with manufacturing enterprises, or the business of selling goods, or of farming, and see if, considering the amount of capital invested and the skill employed, it is not on the average as remunerative as the others.

In the main, horticulture is carried on with small capital. Small capital means small operations and small returns, and, consequently, small profits, in the aggregate, though the per cent. of profit may be large. Then, again, there being no law upon the subject, quantities of people are classed as gardeners who are in no way entitled to its degrees. "Did thee ever observe," a distinguished Quaker once said to me, "that when a man fails at everything else, he goes into the chicken business?" Chickens may be the first choice of the failures in other lines, but horticulture is certainly second; and the ignorance and incapacity of our awkward squad is too often charged against the craft itself. Most gardeners are individualists, and are handicapped to that extent; but whenever they shall have learned the lesson taught them in the daily experience of other businesses, and have combined their capital and their efforts, so that in length of purse, division of labor and perfection of equipment they have taken rank with other consolidated enterprises, then they will have, in my estimation, no cause to dread comparisons with other corporations.

Compared with general farming, horticulture has some important advantages. One is, that the investment required is so much smaller than in farming. The receipts from the best-conducted farms would hardly go beyond \$12 to \$15 per acre, annually, while the average returns from a market garden would not be less than \$100 per acre, per year; that is to say, 20 acres of garden would ordinarily equal in gross returns a quarter-section farm. In profit, it would probably beat it; from which it follows that a gardener may start in life on even terms with a farmer and have the cost of 140 acres of land in his favor. Whether the occupant of this 20-acre garden has a home market for his wares or seeks one abroad, he will in either case have more bargaining to do than his farmer neighbor. Bargaining will be education, in a sense. His transactions will be small, but there will be many of them. "As iron sharpeneth iron, so does the face of a man his friend," and so does much trading

quicken one's native acuteness. "Home-keeping youth have ever homely wits," quoth Valentine; and the facility which the average farm offers for the farmer to stay at home is one of its worst drawbacks. But the gardener or fruit grower is of necessity much in town making his sales, and gets in some degree the same brightening up so apparent in other citizens. The farmer seeks an ultimate market beyond seas. Whether it be wheat, corn, or oats, pork or beef, which he has to sell, the price he must take is fixed, as things now are, by the price of the exported surplus. The horticulturist depends almost entirely upon a home market, which is not held down year after year by a held-over surplus. If we raise more than is consumed this year, the excess cannot be used next year to depress our market again, for our product is perishable, and won't keep.

Then again, both grain and meat draw heavily upon those factors of fertility which, when exhausted, are so difficult to restore. The products of horticulture, on the other hand, are not so exhaustive of the resources of the soil. Fruits and vegetables are nearly all water. It is put up in a thousand different disguises, and with such embellishments of color and taste as only nature can produce; but, after all, water is the basis and essential element of the entire product of the garden. Even the mealy potato is 75 per cent. water, against 14.4 per cent. of water in wheat or corn. When you pay \$1 per bushel for potatoes, 75 cents of the money goes for water. Turnips are 90 per cent. water, and most fruits are even richer in juice than that. The strawberry draws far less upon the soil for its development than upon the clouds; and the gentle rain from heaven, blessing all it falls upon, produces nothing more grateful to the taste and less sustaining to the strength than this berry, which Izaak Walton said God Almighty might have improved upon but never did.

In marketing his wares, the gardener has his customer always at this disadvantage: that whether he offers him young onions and hotbed lettuce in the early spring, asparagus, green peas and watermelons in their season, or cider and celery in the fall, he knows full well that his victim has a hankering within him for seasonable garden truck, ever prompting him, like a still, small voice, to buy. There is no parallel to it in the other branches of commerce. When the mouth waters, calculation and prudence retire.

Horticulture is particularly well situated with respect to its labor supply. Whether the gardener has sufficient help in his own family for the work of his establishment, or whether he is under the necessity of hiring, he will find himself able to use a class of labor that is both cheap and serviceable, and which is not available in general farming, viz., the help of women and children. The plants they drop, the berries and peas they pick, the potatoes they pick up, and the labor of the canning factories, done almost exclusively by women and children, would be a serious addition to the work done in this country entirely by men. Then again, in every populous community women and children are numerous who have to depend largely upon their own exertions, and to whom every dollar they earn in the canning factory or berry patch is just the same as so much money found. It is a matter of some interest to a neighborhood whether an industry is operated in its midst that will make a market for the juvenile and feminine strength and energy which would otherwise go to waste. It is also a matter of very great moment to a man who happens to be poor whether his large family, should he be fortunate enough to have a large family, are to be dependent upon his labor alone, or whether, in the light tasks of the garden, they can support themselves. If there is any other calling among men that offers such an opportunity, I do not know it. There may be some urban pursuit equally fortunate in regard to utilizing the forces of which I speak, but the number of boys idling away their time on the streets of every town plainly indicates that not many of their fathers are able to utilize the wasted and some-



times worse than wasted strength of their sons. In my estimation, there are few things that contain, for boys and girls, more development, discipline and safety than regular tasks.

The consumption of fruits and vegetables is greatly on the increase in this country, but is still far short of what it ought to be, of what it is in other lands, and of what it will be here when transportation with us is put on a level in cheapness with the cheapness of production. The carriage of horticultural products, as we have it, often equals and frequently exceeds the cost of their production. In my own experience, I have frequently found that the freight bills were greater than the net returns. The theory upon which the variations in freight charges are based is, in part, that the higher the price of the goods shipped, the higher the rate; but horticultural products are an exception to this rule. A car load of apples, worth from \$300 to \$400, say, when we have a normal crop, would be charged a higher rate from Kansas City to Denver than a car of cured side meat, worth much more.

Some of the railroads in this state were entirely paid for by government bonds or lands; others were constructed in whole or in part by local bonds and subsidies; and I submit that there is a certain hardship apparent when we are made to pay a price for transportation that will yield ample interest on our own investment and get no credit allowance. There is a still greater hardship in being compelled to give up, in addition to that, an excess over the natural tariff sufficient to pay interest on two or three or five times the cost of a road—money that was never spent in its construction or equipment.

Without material reductions in the cost of transportation, to lower the price of our common fruits to a point where the masses will find them cheap as well as good, orcharding in this country, has, in my judgment, about reached its limit.

One of the serious drawbacks to the business of horticulture is the prevailing ignorance upon the subject—ignorance that includes both the laity and professionals. With all the teaching of our industrial colleges having departments devoted to this industry, with ever so many magazines published in its interest, the honest inquirer cannot get a positive answer to his simplest questions about it. We do n't know for sure whether the stock upon which a graft is set will affect the quality of the fruit; we do n't know the effect of pollinization; we do n't even know how deep to plow; we do n't know how to fertilize; we do n't even know whether salt is good for asparagus; the value of insecticides and fungicides is a debatable question; we do n't know how many eyes should be left in a potato set, nor how deep it should be planted, nor how much or what fertilizer can be used upon it with profit, nor whether it should or should not be planted in the light of the moon. To all these inquiries, and a thousand others, the books put one off with a *reason why*. The average horticulturist, who tries to arrive at the most profitable practices in his profession, if he is credulous enough to try them, will be led astray time and again by dicta which he will see in print, well signed, and, before he gets hardened by disappointment, will be in full sympathy with the man who wished he knew less than to have learned so many things that weren't so. There is no fad in learning that is more disappointing than the cult called agricultural science. Science literally means knowledge, but as applied to agriculture it is commonly accepted to mean an intellectual short cut to improved processes in cultivation through an acquaintance with the natural sciences.

I wish, for my part, that every young horticulturist could take a degree of 100 in botany, but he would be surprised himself to find how little figure it would cut in the actual business of producing vegetables and plants. Chemistry is supposed by many people to be the most important factor of rural learning, and I should be glad if every horticulturist were able to pass a creditable examination in quantitative and



qualitative analysis, but I should n't expect it to be perceptible in the results of his gardening.

Chemistry plays much the same part in agriculture it does in war: certain elements constitute fertility; certain other elements constitute gunpowder. But neither the farmer nor the soldier in action bothers much about the chemical composition of their familiars. Their problem is how to use them.

In no important departure made by the allied industries of agriculture and horticulture, except in the notable instance of Chancellor Snow's exploits against the Chinch Bugs, has the initiative, so far as I am aware, come from the schools. The mechanics of this country have done more than any other influence to advance these great callings, by putting them in a way to unload their heaviest burdens upon horses and steam. What the horticulturist needs more than a knowledge of the sciences involved in the development of plants is a perfect system for his operations in the garden or orchard. He will stand or fall by his practice; not by his knowledge or want of knowledge of the obscure principles of growth. Peter Henderson remarks in one of his books how often he has noticed that gardeners entirely illiterate have outstripped those located alongside them who were well grounded in the teaching of the books, and characterizes the so-called science of agriculture as "awful humbug."

While I say this, I do n't want to be understood as underrating our agricultural schools. I appreciate them at their full value, and have noticed with pleasure those changes in their direction which seem to me to give their future a promise which their past did not realize.

If I were asked to give the most important feature of horticulture, as Demosthenes was of oratory, I should answer, not "action"—though a lively move is important in gardening—but system and routine. There is no industry in which routine is more potent than in ours. The only way it can be brought to our aid in its full effectiveness is through simplicity of operations. Gardening and farming are too much mixed. There are stores that sell everything from a cambric needle to a threshing machine, and there are horticulturists who grow fruits, vegetables, and flowers. But such stores and such horticulture must be run on a large scale, with each department under the direction of an expert. The store business is fast going into the hands of such aggregations, and the garden business may follow suit.

There is room in it yet, however, for the single-handed operator; and his greatest room for improvement lies, in my estimation, in undertaking but few things, and spreading out correspondingly in the reduced selection. The most successful horticulturists of my acquaintance make what mercantile people call "leaders" of one or two or more things which they particularly develop—minor crops being put in merely to fill up with. Such people, it seems to me, may fairly be considered specialists, though that word is commonly reserved for those whose motto is "this one thing I do." I have great confidence in specialization in horticulture, but I readily concede that it may be overdone. When Oliver Johnson was asked, in the Beecher-Tilton trial, if he was not a spiritualist, he replied that he was a spiritualist, but he was not a — fool. One can be a specialist in horticulture within the same limit. It is true that Mr. Wellhouse confines his horticulture to apples, and Mr. Groves confines his to potatoes, and that they both prosper; but many people have n't the ability to follow in their footsteps, and many branches of the calling are not large enough for one to rest wholly upon. Whatever the size and scope of the gardener's routine, a weakness that stands between many of them and permanent success is a tendency to change. "Unstable as water, thou shalt not excel," was written of Reuben, and might be said of many in our time. Not only gardeners among our fellow-countrymen are unstable, but a frightful percentage of all ranks pay the penalty of

instability by their failure. Margaret Fuller said man would be perfect if he would persist. Darwin preached a survival of the fit, not the fittest.

Another weakness of the horticultural situation lies in its unfitness for coöperation along the lines in which it is pursued. I see no prospect or possibility of men combining in the miscellaneous way so often attempted. A spasmodic effort may succeed temporarily, but the weakness, the meanness and the limitations of human nature are all against its continuance. One of the vagaries of a harebrained man is, that he thinks he is the best fitted of anybody to run things. The number of the harebrained would never be suspected till they are stirred up. They are as irrepressible as they are numerous, and wreck all they touch.

I was an enthusiastic Granger in Grange times; and the feasibility of realizing our dream of combining the business of the agricultural classes, both in their buying and selling, is as apparent to me now as it was then, if only men were not made of clay, and some of them of pretty poor clay at that. The only possible step in the direction of connected effort, or "bulking business," as we used to call it, is, for each man to give himself, in his own line, the bulk which an ordinary Grange might have had. Briefly formulated, my motto would be that of the famous Roman: Not many things, but much. Just how many things, and just how much, is a question each man must answer for himself.

Judge Wellhouse, so well known all over Kansas, eschewing all other branches of horticulture, makes of apples, and winter apples at that, the sole and only basket for all his eggs. He was poor when he began the enterprise; now he is rich. The test of the pudding is the eating. Within two miles of my father's home, in Michigan, they have drained the lake I used to skate over, and a stock company is now raising celery upon the lake bottom. They pay a manager \$1,000 a year, and ship celery by the car load as far as to Kansas City. At Olden, Mo., a private corporation has gone to raising fruit on a commercial scale. They have over 2,000 acres planted in one body, and the reduction they were able to secure on express rates to Kansas City, because of the extent of their shipments, amounted to \$12,000 in one year. The great principles of coöperation, concentration and the economy of size are sometimes made to work in country as well as town.

But whether horticulture is adapted to large operations is of minor importance; its crowning glory is in its small workings, where it enables the man of small capital to undertake an independent business, in which he will have ample scope for all his skill as a workman, for the exercise of his best wit and judgment in planning his garden campaigns, and for the development of his mercantile instinct in making his daily sales. Such a man is properly contrasted, not with merchants, bankers, and manufacturers, but with the clerk at his desk, the mechanic at his bench, the engineer at his throttle. They and such as they must, in the nature of things, rely upon the boss to do their thinking and to furnish their employment. There are men to whom the freedom from the orders of employer, foreman, or superintendent—the opportunity to strike out on their own lines and put their merit to the test and to develop their originality—is more than the softness of the job or amount of pay. With the frugality required to save the price of a home in town, this venture may be made. Where it does not result in personal development of both brain and brawn, of ultimate profits in excess of the foretime salary, of health and strength to the children, now happily relieved from the deleterious influences of the street, and an undertone of contentment and joy from the contact with nature and the freedom from restraint, then the fault lies in the unfitness of the man himself.

At the close of this address, the session adjourned to 9 o'clock A. M. the following day.

# MORNING SESSION.

THURSDAY, December 7, 1893.

President Taylor in the chair.

A paper was read on

## DEGREES IN HORTICULTURE.

BY J. H. EWBANK, OF HOLTON.

Nearly a generation ago that eminent editor, statesman, and agriculturist, Horace Greeley, added greatly to the sum total of human knowledge, and astonished the agriculturists of this country with what he knew about farming. Since then there have been agricultural editors who, in order to distinguish between a horsrake and a threshing machine, or a pruning hook and the traditional spear from which it is supposed to be made, must get the unbiased opinion of the implement dealer. Yet these useful men, with an occasional suggestion from the greengrocer and the engraver, aided by a missionary spirit and a benevolent mind overflowing with inner consciousness, evolve knowledge that cheers and edifies the horny-handed sons of toil. They can tell just when the strawberries should be dug and the potatoes picked; how the sheep should be mulched, and the turnips mowed; the very hour when the apples should be taken from the vines; and the time of year to get a self-binder for harvesting the blackberry crop.

At first the idea of *my* having a paper at a horticultural meeting fairly appalled me; but the lives of the great Horace and his illustrious co-workers in agriculture remind me that I, too, may make my life sublime as a writer on themes horticultural. And if, in departing, I do not leave behind me any remarkable footprints on the sands of time, I may at least make some well-defined tracks in the strawberry bed—footprints (or tracks, as the case may be) that perhaps another, possibly many others, it may be some of you, my friends, or your grandchildren, or your neighbor's descendents, sailing o'er life's troubled main, perhaps shipwrecked upon the shores of horticultural failure, seeing these footprints, broad and long and well defined, these signs of a vigorous civilization, may be inspired to "brace up," or, in the milder but more elegant language of the poet, they may "take heart again."

Then, good friends, let us all be up and doing, each to his tasks: I from time to time giving you great, golden nuggets of wisdom, telling you how, only, as horticulturists you can be prosperous and happy; and you, with the strange infatuation born of human perversity, going on from day to day and from year to year ignoring my sage advice, and, notwithstanding my solemn warnings and earnest entreaties rushing on, almost madly, to inevitable success. With a heart, then, for any fate—you achieving, I pursuing, you learn to labor and I to wait—wait for the fulfillment of that rather general truth, that a prophet is not without honor save where he is pretty well known.

As I warm up to my work, I recall that *I* am an old-time horticulturist—one, as you might say, to the manor born. How well do I remember, when as a boy gathering fruit, near the close of the day, in my father's large, carefully-selected and well-kept peach orchard, that my natural conclusion was that if peaches did not taste any better to other people than they did to me they would hardly care to pay good, round prices for them; but with the adaptable, unconquerable appetite of a growing boy, within a short time, possibly the very next day, I would conclude that there was nothing more delicious than a dozen or so of nice, ripe peaches. In my father's fine gooseberry patch, at once the admiration, the envy and the center of attraction of the neighborhood, were some of the most daring exploits of my horticultural days enacted. Not unfrequently have I, with torn and bleeding fingers, outraged my pal-

ate and overtaxed my assimilative powers with gooseberries ripe, gooseberries green, and gooseberries inexpressibly sour.

Did any boy ever grow up to be a liberal, well-balanced, broad-gauged horticulturist without taking a happy, optimistic view of life from the top of a cherry tree in the warm days of June or July? What does it matter that clothes and hands and face are stained with gore! Every young horticulturist is eager for the fray, and is ready to wage war upon cherries, even to extermination. What does it signify that in the prosecution of the war the young soldier seeks the support of a rotten limb and is suddenly precipitated to the ground, having the breath thumped out of him! These minor catastrophes are mere incidents in the training of the youthful horticulturist for the sterner responsibilities of life.

A personal word with you, fellow horticulturist: Do you really think, my friend of large brain and manly brawn, of well-trained mind and generous heart, that you would have been what you are if you had never had the fun of clubbing the neighborhood persimmon tree? What might the secretary of agriculture himself have remained but for that exquisite part of his agricultural and horticultural training? With these few prefatory remarks, I shall proceed to discuss my subject, which is "Degrees in Horticulture."

In discussing the degrees of horticulture, we do not mean that to belong to the noble order of horticulture one must be bound with obligations, oaths, grips, signs, and passwords; that he must be led through dungeons dark, in clanking chains, through fire, and flood, and famine, and shipwreck; that he must be made acquainted with all the insignia of mortality and the tomb; that in horticulture there are any special signs, badges or regalia for the degrees of friendship, love, charity, or fidelity, for the scarlet degree, for the royal arch degree, for the sir knights, for the encampment, for the high much-a-mucks, for the most worthy high grand moguls, and so on, etc.; but with a little technical discussion of the terms of the subject, and a little popular elaboration of some things thereby suggested, we shall have said our say.

The term "horticultural" is from *hortus*, a garden, an orchard, and *cultus*, culture; literally, the cultivation of a garden or orchard. Degree is from *de*, down, and *gradus*, a step; literally a step down, or a stair. But if we step down, and the step or stair remains, is there any good reason why we may not step up again? So there may be degrees up as well as down. Taking the whole expression, *degrees in horticulture*, literally, we would suggest that it means the steps down into the cave or cellar where are stored the products of the garden or orchard; as, for instance, where the strawberries have been kept on ice since morning, or where the apples are stored away in pleasing variety and tempting toothsome-ness.

Going down thus into the cellar, to admire and sample the fruit, might not inaptly be termed the first or initiatory degree. Just at this point I want to remark that, as long as the apples should last, it would be my desire to be initiated three or four times a day.

There is another degree, not taken by *all* the initiates, that might properly be designated the *political degree*.

It was long ago discovered that the path to the public crib often leads over the field, across the garden, and through the orchard. Taking this degree is sometimes easy, and sometimes very hard. It depends largely upon the disposition and frame of mind of those doing the work of this degree and administering its rites.

More or less work is done in the degree which I shall now describe by every experienced horticulturist. This degree is taken in those seasons when the destroying insects are unusually numerous; when the seasons themselves are much too wet or a great deal too dry; when there are very hard freezes in the winter and killing

frosts late in the spring; those seasons when fruit dries or cooks on the trees and rots in the cellar; when fruit is scarce and sour, and the surplus will not get sugar enough to sweeten what is left; the year that notes fall due and there is nothing with which to pay them; when the knees and the elbows are out and there is no money for new suits, and when there is very little cloth left for patching; the year when the little folks stay in, for their clothes are thin and they have no shoes; when the fire is not very hot, because fuel costs money; the time when it requires much philosophy, large grit, great faith in the Good Father above and in the possibilities of the country, in order to keep the cheery face, to say the hopeful word, and to do the whistling in which is discovered no mournful note.

It does not require all these signs in order to distinguish the hard-times degree. It has doubtless served a useful purpose, but those who have taken it, with all its solemn rites, are glad that it is behind and not before.

We now come to the discussion of the work of a degree which, in its broader sense, embraces every sphere of human activity. The work of this degree was going on when men first began to stand erect and flowers grew toward the light. The World's Columbian Exposition, its wildest dream of beauty, its acme thus far in science and in art, in ethics and in culture, an exhibition, a revelation that astonished the world at what it had been doing, at what it could do, this triumph of all history, was made possible by the work of this degree—the degree of progress. In horticulture, its work was taken up when men took the wild, sour and bitter fruits of nature, and by cultivation began to develop them to usefulness, palatableness, and sweetness.

The breeder of fine stock benefits the community, to the extent of his trade and his influence, by raising the standard of excellence in domestic animals.

The thrifty, successful farmer who demonstrates that farming pays, and that it is not necessarily menial drudgery, who shows by his own living that there may be intelligence, culture and refinement on the farm—such a man is a blessing to his community and the world.

The minister with a clear head and a warm heart, set on fire by love divine, is indeed a light, an inspiration, not only to his own people, but to the great throng outside, who, hungering and thirsting more or less after righteousness, are yet unfilled.

The attorney who, with splendid intellectual powers and fine moral nature, regards honor as infinitely preferable to any fee, however tempting, with the peculiar temptations attending his business in thus holding up high the standard of practice in the noble profession of law, is one of the world's noblemen, in character and influence.

The teacher who studies child nature and adapts her work accordingly, who has a sympathetic heart and boundless enthusiasm, who is at once teacher, guide, and friend—she is more than a teacher of children. Her influence, as well as that of the others just outlined, can never be told until true measure shall be taken of all human endeavor.

But, some one might ask, what has all this to do with the fellows who kill bugs and write essays, eat good picnic dinners, and tell how they raise "whoppen" big fruit?

Any organization or body of men who in the prosecution of their business add to the general healthfulness and to the cooling of the overheated blood of a carnivorous, pork-eating people, and thereby contribute to the sum of human enjoyment, who elevate the ideals of rural life, and utilize some of the unemployed forces of human labor—this body or organization is entitled to the grateful consideration of the patriot and philanthropist. What though business is the basis of their work!

An occupation that is not business in its better sense is of very little use in the world.

The Horticultural Society of Jackson county, and I presume the same is true in greater or less measure of the State Society, has labored in season and out of season, in sunshine and in storm, in the depths of disappointment and the chagrin of defeat. But, with perennial hope, the animating spirit of the degree of progress, they have considered well that "he who continueth unto the end, the same shall be saved."

As one of the great rewards of their wearying not in well doing, the Society, our city and our county are honored with this meeting. And as a kind of connecting link between the Society in session and the intelligent laity not present, but who will be sorry they were not when they learn what they have missed, I bid you God-speed.

When this meeting adjourns, and you go to your homes and seek your well-earned repose, may your dreamless sleep be interrupted only by visions of garden truck sold by the ton and hundred weight instead of by the petty bushel and fractions thereof; of apples so generous in proportions that, as a goodly company will live luxuriously several days upon a single specimen of the fruit, they are sold at from 40 cents to \$2 each, rather than by the primitive measure of bygone days. In your brilliant fantasy may you see a family of six sitting down to a delicious evening repast from one of the new early strawberries, and giving, in their generosity, the unused half to their less fortunate neighbors. May you be carried on the magical pinions of fancy to the "Banquet of the Occupations," and be placed at the head of the table, or at the right hand of the master of ceremonies; and may your cider not needed for vinegar be turned into nectar which shall supersede the best wine at the feast. Allowing for the incongruities of exaggerated proportion in your vision, may there yet be abundant reward for the faithful work done in the degree of progress, and, as it was with "Ik Marvel," at the end of his bachelor reveries, may you awake and find that your dream is real.

#### EXPERIMENT STATION VINEYARD, 1893.

REPORT BY S. C. MASON, STATE AGRICULTURAL COLLEGE, MANHATTAN.

The early explorers of our Atlantic coast gave glowing accounts of the fine wild grapes found in the forests of the new world, and doubtless these wild vines furnished those hardy pioneers with both food and drink.

When farms began to emerge from the wilderness, and the settlers had time to devote to the planting of orchards and vineyards, much time and energy were spent in attempting to cultivate the European vines. It was only after repeated failures that attention was turned to the native grape of the coast, *Vitis Labrusca*. Here were found vigor, hardiness, and abundant productiveness, but the finer qualities of the old-world fruit in size and flavor were sadly wanting. It was thought that, if hybrids could be secured between the European vines, with their fine flavor and superior size, and the American hardy and enduring stock, new varieties might be secured which would combine the strong points of the two. While Mr. Allen was earlier in the field, giving us Allen's Hybrid as the result of such a trial, it is to Mr. Edward S. Rogers, of Salem, Mass., that we owe, more than to any other man, the production of a really valuable list of hybrid grapes. This work was accomplished in 1851, by taking a native vine known as the Carter or Mammoth Globe as the pistillate or female parent, and using pollen in part from the Black Hamburg and in part from the White Chasselas, two choice hothouse varieties.

From the Black Hamburg cross were secured such well-known and valuable sorts as No. 1, Goethe; No. 3, Massasoit; No. 4, Wilder; No. 15, Agawam; No. 44, Herbert,

and No. 53, Salem. These combine in a remarkably even manner the characters of the parents. The vines show much of the habit of the wild fox grape, from which they were raised, but with enough of the *vinifera* traits to remove any doubt as to their being true hybrids. While regarded as entirely hardy when first introduced, they have been found partially tender upon a wider trial, and in our experiment station vineyard have been found to need winter protection when the mercury falls lower than 12° to 14° below zero. The fruit of these varieties, while varying greatly in color and flavor, is in all cases a great improvement over the wild variety. In keeping qualities, their resemblance to the male parent is quite marked, the fruit of most of these hanging on the vines long after it is ripe, and becoming richer and sweeter.

With the grand stride in the improvement of native grapes achieved in the production of the Concord, it was but natural that many attempts should be made to secure valuable hybrids by fertilizing this with pollen of European varieties.

In the Brighton, we have the product of Concord + Diana-Hamburg, this last being a hybrid of Diana with Black Hamburg. This is a wonderfully handsome, dark-red grape, and one of fine quality, though not so free a bearer as we could wish.

Jefferson, a grape of similar appearance, though not as fine a bunch, is from Concord + Iona, a Catawba seedling. Whether this renders Jefferson a hybrid, or only a cross, is a question that brings up the whole vexed Catawba history; but, to my mind, the strongest evidence of a trace of *vinifera* blood in Catawba is the behavior of some of its seedlings, notably Iona.

In Highland, we have a black grape of magnificent bunch and berry, and fine quality; said to be produced from Concord + Jura Muscat.

Lady Washington and El Dorado are sisters, obtained by crossing Concord with Allen's Hybrid, giving them only a fourth of *vinifera* blood. These are both white grapes of very fine quality, and their vines show a more rank and healthy foliage than usual in this class. In Irving, we have another fine white grape, from Concord and White Frontignan; but Triumph, from Concord and Chasselas Musqué, gives us the finest white grape in our collection. All of these Concord hybrids have been found, after repeated trials, to be tender, and need protection, except in the mildest of Kansas winters.

There are a few other varieties of similar parentage which are worthy of notice. Downing has a very large, fine bunch, with a large, oval, purple berry, having the meaty texture found in the California grapes. This is supposed to be produced from Croton + Black Hamburg. Croton being from Delaware + Chasselas, we have in Downing at least three-fourths of *vinifera* blood, and are not surprised to find the vine weak, liable to disease, and easily winterkilled when not protected.

Mills, claimed to be the product of Creveling and Muscat Hamburg, is one of the most interesting varieties in the collection. The berry is large, black, and shining, and the bunch simply perfection when well filled out. So tough skinned are these that they might almost be shipped in bags instead of baskets, and their keeping qualities are quite remarkable.

The Delaware has been, with little question, awarded first place for quality among American grapes. Discussion has been rife as to its origin, and this is a horticultural mystery that will never be cleared up, but I am ready to side with those who do not believe the Delaware to be of pure *Labrusca* blood, but to possess an accidental cross from some of the old *vinifera* vines early planted in this country. Be this as it may, this dainty grape has been used as the pistillate parent in a number of hybrids.

The Croton is a very fine, little, white grape, of great keeping qualities, which



was raised from seed of Delaware fertilized with Chasselas pollen. The vine shows strongly the *vinifera* characters, and the fruit still more.

Dutchess, so named from Dutchess county, New York, is a white grape, of remarkable qualities, and will bear shipping the best of any American white grape I am acquainted with. This was grown from a white Concord seedling fertilized with mixed pollen of Delaware and Walter. Walter is a red grape, of close, compact bunch, tough skin, and fine flavor, obtained from Delaware + Diana, a Catawba seedling. Now, if we grant that both Catawba and Delaware are pure natives, Dutchess must be a native also, though the product of several crosses; but the many strong *vinifera* traits found in Dutchess seem to me to preclude this idea entirely.

Poughkeepsie Red is another which must be discussed from the same standpoint. Grown from Delaware + Iona, it is, like the last, native or a *vinifera* hybrid, according to whether Delaware and Catawba be pure or not. It has the delicate fruit, curing to a perfect raisin, and the characters of vine and leaf that we recognize in varieties with a half or more of *vinifera* blood. While Delaware itself has proved completely hardy with us, none of its offspring are equally so, but all need winter protection.

In Arnold's hybrids we have another native species, the *Vitis riparia*, of the northern states, used as the pistillate parent. Clinton is the variety taken upon which to make the cross.

Othello, Arnold's No. 1, is from Clinton + Black Hamburg; Antrechon, Arnold's No. 5, Clinton and Golden Chasselas; Brant, Arnold's No. 8, Clinton and mixed *vinifera* pollen; Canada, Arnold's No. 16, Clinton and Black St. Peters. These are all grapes of black color, medium-sized, round berry, and compact bunch, showing strongly the Clinton parentage. In flavor they are sharp and decidedly wild, till very ripe, when they develop a good deal of richness and a good capacity for keeping. The *riparia* blood seems to be more strongly prepotent, judged by the results of these experiments, than the *Labrusca*. The characters of vine and leaf show much of the *riparia* also, but the desired hardness was not secured, and the Arnold hybrids should be given winter protection.

Naomi is a white variety, one of Ricketts' hybrids, from Clinton and "one of the Muscats." This is decidedly delicate and tender.

Marion, a black grape, similar to Clinton, fertilized with Black Hamburg, has given us Amber Queen and Norfolk, two dark red, richly-flavored grapes, of much more *vinifera* characters than any of the Arnold's.

Summing these up, all hybrids of *Vitis riparia* with *Vitis vinifera* have given vines slightly too tender for our severest winters, bearing fruit of considerably improved flavor and excellent keeping qualities.

The old Taylor, or Taylor's Bullitt, is a grape of *Vitis riparia* blood, but believed from some of its characters to possess a trace of *Vitis Labrusca* blood. Several seedlings from this have proved much better than the parent, one of the best being Elvira.

Mr. Munson has used this as the basis of a number of his crosses, of which I will give the leading ones: Blanco, *Elvira* + *Delaware* (?); Conelva, *Concord* + *Elvira*; Beagle, *Elvira* + *Ives*; Bell, *Elvira* + *Delaware*; Early Market and Rommel, *Elvira* + *Triumph*; Ruby, *Elvira* + *Brighton*; President Lyon, *Elvira* + *Lindley*. All of these are hardy vines, and the most of them fairly productive, but the fruit in all cases lacks in some important character that is needed to make them really valuable. Some lack in size, more of them in quality. Rommel, though a pretty fair fruit, is too thin skinned and tender to bear the necessary handling.

By the use of *Vitis Linocumi*, the post-oak grape of Texas, fertilized with pollen of Herbemont, Mr. Munson has secured a number of varieties which must prove of

great value to the Southwest, and may yet prove important in Kansas. They all bear a compact bunch of rather small or medium-sized black berries. Like the Herbemont, they are almost entirely wanting in pulp, and are very juicy and pleasant when fully ripe, which is quite late. While slightly tender, and needing winter covering, they are vigorous growers. They do not bloom till the first week in June, and for this reason may prove of value in the high, western portions of our state, where late frosts often destroy the bloom of our standard varieties. The leading varieties of this lot are named Blood, Sweetey, Letoney, and Carman, the last being the most valuable. One named Texas Highland, from *Vitis Lincecum* + Agawam, is one of the most promising of Mr. Munson's new sorts, as tested with us. Another, named Fern Munson, from *Vitis Lincecum* + Triumph, shows considerable promise.

Again let me state what I have said in these meetings before, that the tender varieties of grapes of all sorts are successfully carried through our severest winters by laying the vines down and covering with earth. We do this at a cost of not over 5 cents a vine, which a pound of choice fruit will pay for.

With a knapsack sprayer and Bordeaux mixture we have been quite successful in combating fungous diseases. With such treatment, these choice varieties may be enjoyed every year, with very few failures.

### CELERY CULTURE.

REPORT OF STANDING COMMITTEE, BY E. F. WALTER, OF WAKEFIELD.

In making a report upon vegetable gardening, it appears to me more desirable to confine my remarks to some special vegetable, the growing of which is not generally understood in this latitude, instead of recommending a long list — like a seedsman's catalogue — of the most desirable varieties for cultivation.

Having had a number of years' experience growing celery successfully in Kansas, I have chosen the cultivation of celery for my subject.

The methods of growing and bleaching celery have been revolutionized within the past few years. We no longer plant in a trench filled with manure and prepared with so much labor, but upon the level ground, the same as any other vegetable. The recent introduction of so-called self-bleaching varieties has also very much reduced the work and cost of bleaching, high banking with the spade and shovel now being unnecessary with these varieties. The long-keeping kinds, however, require somewhat different treatment. The greatest saving of labor in bleaching celery has been in the introduction of bleaching houses, or cellars, specially constructed for the purpose, where the celery is stored to bleach. I will explain these points more fully in their order. I must say here, that it is almost impossible to grow celery successfully and profitably in Kansas without water. It must have water, and plenty of it, during our dry, hot spells. If its growth is seriously checked, rust or blight will quickly appear, and the crop be ruined in a few days. We have experienced this loss, but, having profited by our experience, have not been seriously troubled for several years.

In growing plants for setting out, the land must be rich, moist if possible, and reliable, fresh seed must be sown. Celery seed two years old is absolutely worthless. There are many excellent varieties, but the introduction of White Plume, with its natural white foliage, makes it so attractive, and has so simplified the bleaching process, that the great celery district around Kalamazoo grows White Plume to the exclusion of nearly all others. California also is now putting it upon our markets. It is an excellent variety for early market, and will grow to good size in Kansas; but, owing to our hot, dry atmosphere, the delicate white foliage cannot be produced until cool weather. During the hot weather, the leaves turn green as

fast as they develop. It can only be bleached successfully here during September, in a cool, dark cellar. When nicely grown, it is very showy, though not of the best quality, and, while it is on the market, sells more readily than any other variety. Golden Self-blanching, a sport of White Plume, is also a fine, handsome celery, hardier, of better quality and a better keeper than White Plume, but more of a dwarf and more branching in habit. It is difficult to keep either of these varieties after Christmas. We have tested most varieties of recent introduction, but have returned to our "old love," viz., Golden Heart, for the main stand-by, as the best adapted to our climate. It grows larger, is hardier, keeps better, is more solid, and, when well bleached, is of better quality than any celery we have grown during the past 14 years. We shipped this variety last week, for Thanksgiving, weighing 15 pounds per dozen, and it netted us 90 cents per dozen at wholesale. I found, during my visit to England, the past summer, that these self-bleaching varieties meet with little favor upon the London market.

The land for sowing the seed must be reduced to the finest condition possible, by smearing or rolling, and the seed sown about the middle of April, in rows one foot apart, using one ounce of seed to about 50 yards in length of row, covered not more than a quarter of an inch in depth, and well firmed with the feet if the surface is at all dry. The seed is very slow germinating, and after being once well wetted, by rain or otherwise, must not be allowed to dry out, or a large percentage will fail. If the surface is allowed to bake, total failure will be the result. As soon as the young plants are one or two inches in height, they should be thinned to stand one each apart, and, if they make a strong, vigorous growth through the month of June, they should be sheared off, to make more stocky plants. The plants should be set out between the first of July and first of August, and may follow any early crop, as potatoes, cabbage, etc., the land having been heavily manured previously for the purpose. It cannot be made too rich; 100 loads per acre of good manure are not any too much. A top dressing of nitrate of soda, at the rate of 300 or 400 pounds per acre, should also be harrowed in just before setting. It will give the young plants a good, vigorous start. If the plants are large and strong, trim off about one-half the top, and reduce the tap root to four or five inches in length before planting. Plant with a dibber, and *firm them well*. Plant, if possible, immediately after a soaking rain. The rows may be from three to five feet apart, according to variety, and the plants five or six inches apart in the row, requiring about 25,000 plants per acre. If dry, hot weather prevails, and it is necessary to set out the celery, stretch the line where they are to be planted, open a small furrow with a hand plow or hoe, turn the water into the furrow and let it run until it reaches the lower end. In a few hours, set the plants in the middle of the furrow, and scarcely a plant will fail to grow. The plants in the seed row must also be thoroughly soaked before digging, or the fibrous roots will be broken off in transplanting, and many plants will be lost. After setting, the ground must be stirred, kept well cultivated, and not a weed allowed to grow. Water must be supplied during dry, hot weather by opening a furrow about six inches from the plants, on each side, and running water into them until the ground is soaked. Next day, cultivate the ground level with a harrow-tooth cultivator, to check evaporation as much as possible. This must be repeated every week or 10 days during severe dry spells.

If the crop has made good growth, it should be one foot or more in height by the middle of September, and the White Plume may then be handled for bleaching. Various methods are recommended to accomplish it. Some advise setting boards edgewise on either side of the row, and thus bleaching it. Others advise tying cardboard around each stalk, etc. We have found that, while all these processes can be successfully employed to bleach a small quantity, they all fail in the one essential

of giving crispness and quality. In our climate, these methods are liable to cause rusty, hollow, fibery celery; at least that has been our experience. The simplest and cheapest method we have found is, to take a ball of grocer's twine in one hand, gather the leaves together into an upright position, and pass the twine around the plant to hold it up, then treat the next plant the same, and so on down the whole length of the row, without cutting the twine. We then take a one-horse plow and throw a furrow as high as possible on each side of the row. There is a celery hiller now manufactured for this work, but we have not yet had any experience in the use of it. In this banking process, no substitute for mother earth will give the fine nutty flavor, or make celery so sweet and crisp. In two or three weeks after banking it will be ready to remove to the bleaching cellar to finish. The plants must be dug carefully, with all the soil adhering to the roots, and set upright, closely packed, in a cool, dark, well-ventilated, frost-proof cellar. In three or four weeks it will be in fine condition for market. In the absence of a cellar for the purpose, celery may be stored in a trench, as deep as the celery is high, about one foot in width, and covered securely from frost with boards, straw, and, as the season advances, a covering of earth. The whole crop should be stored in this latitude by the 10th of November. Celery thus stored can be kept until February, if good-keeping varieties are grown for late sales. Prices always rule higher after Christmas.

We experimented the past season upon a small scale with the new method called the "new celery culture." We set 1,000 plants, seven inches apart each way, and kept them liberally watered. They grew luxuriantly, and apparently bleached fairly well, but not more than one-fourth was fit for market. The rest were hollow, fibery or stringy, and worthless. The part that was marketed was pronounced inferior in quality and flavor. We shall experiment again next year, using a liberal dressing of nitrate in addition to heavy manuring, and will report results to this society in due season; but we have at present little confidence in the method for our climate.

#### ON RESOLUTIONS.

BY F. HOLSINGER, OF ROSEDALE.

Your committee submit the following:

*Resolved*, That the hearty thanks of this Society are hereby tendered, first, to the members of the Jackson County Horticultural Society and citizens of Holton, for the kind and hospitable manner so cordially extended during our visit among them; and, second, to Mrs. Ella W. Brown and Prof. J. H. Ewbank, for their valuable and interesting contributions to the exercises of the meeting.

#### ON OBITUARY.

BY E. P. DEIHL, CHAIRMAN OF COMMITTEE.

Your committee beg leave to submit the following report:

WHEREAS, Since our last meeting it has pleased an All-wise Providence to remove by death from our midst Dr. J. M. DeBall, of Paola, E. Snyder, of Atchison, and Dr. Wm. Evatt, of Lawrence: be it

*Resolved*, That by their decease the interest of state horticulture has suffered a serious loss.

*Resolved*, That we extend to the bereaved families, each respectively, our hearty sympathy in their bereavement; and that a copy of these resolutions be spread upon the records of the Society, and an authentic copy thereof be delivered to the families.

On motion, the report was adopted.

## REPORT ON FRUIT EXHIBITED.

BY J. F. CROIL, CHAIRMAN.

Your committee report that we find on exhibition some very fine specimens by J. M. Priddy, of Shawnee county, of the following varieties of apples: Winesap, Smith's Cider, Willow Twig, Ben Davis, Kansas Keeper, Gilpin, Roman Stem, York Imperial, Missouri Pippin. By G. E. Spohr, of Manhattan: Ben Davis, Winesap, Missouri Pippin, Gilpin, Rawle's Genet; also a few specimens of apples resembling very much the Missouri Pippin; an examination shows a finer texture of flesh, a more solid coloring, and, by some members, is regarded of a finer flavor.

Your committee would suggest that this apple receive the Society's close attention in the future, and take such action regarding it as the developments of its promising future will warrant.

On motion, the report was accepted.

## REPORT ON "THE GOOD OF THE SOCIETY."

BY B. F. SMITH, OF LAWRENCE.

Your committee beg leave to recommend that an unceasing effort be made by each and every member to interest the young people in their respective communities in the important industry of horticulture; that they be encouraged to attend the meetings of horticultural societies, both local and state, and be taught practical work by practical men; also, that our women be induced to become interested in the light work of packing and preparing small fruits, etc., for market; that the recent failures of crops should not tend to discouragement, but rather be a stimulant to more careful efforts and the application of better methods in the future.

At the close of these reports, a paper was read on

## INSECTICIDES AND FUNGICIDES.

BY DR. A. NEWMAN, OF LAWRENCE.

There is, perhaps, no question which presents itself to the horticulturist of today with more emphasis, or which demands more attention or study, more careful experiment and observation, than that which pertains to the arrest or diminution of the damage done our fruit crop by the rapidly-increasing army of insects, and the not less serious damage resulting from fungous growths. From these two sources results a very great aggregate loss to the fruit growers, not of Kansas alone, but of the whole country. Neither of these enemies of the fruit grower is local in their habitation or their work. I saw recently, in one of our grocery stores, Rhode Island Greenings, from Maine, among which not a specimen could be found free from scab. If the total damage from these two sources could be accurately known and reduced to figures, I doubt not that the aggregate would startle us; certainly, unless we have given the subject careful study and thought. The question how best to meet these evils is, therefore, one of vital importance to us. Since spraying was first suggested as a preventive of the damage done by insects, it has been widely used, and with results sufficiently satisfactory not only to cause its continued use by those who first adopted it, but also to largely increase the number of those who spray. And yet, for the most part, spraying has not been done in a way which would clearly demonstrate accurate results. Experiments of this kind have been limited to a few experiment stations, the published results of which have been encouraging. But I think it evident that spraying, as generally done, has not, during the present season, met the expectation of all its advocates. Partial or complete failure to obtain good results have not been rare cases. For the right solution

of a problem of this kind, we need to take account of both failures and successes. The true solution must be consistent with both. An explanation of our failures must be possible and reasonable which does not militate against the efficiency of the remedy. We have reason, I think, to hope that continued experiment and observation will furnish us the basis for such an explanation. Meanwhile, those of us who have experienced failure more or less complete must have a care that the pendulum of our faith, if it has swung too far in one direction, be not allowed now to swing too far in the opposite direction.

The subject of spraying presents to us three questions, upon neither of which, I may safely assume, is our knowledge complete:

1. When shall we spray?
2. How shall we spray?
3. With what shall we spray?

In regard to the first question, it is, I think, pretty well settled that, with insecticides, nothing is gained by spraying apple trees before the blossom leaves have dropped; but with the fungicides this is not so. The first application of these should be made before the blossom buds open; but just how long before, in order to obtain the greatest efficiency, has not yet, I think, been accurately determined. We must bear in mind that the use of fungicides is preventive, not remedial.

Upon the second question, How shall we spray? we have yet, I think, something to learn. A great variety of pumps and nozzles are in use, and it may, I think, be safely inferred that a great variation exists from this cause in the thoroughness and efficiency of the application.

The third question is also one upon which our knowledge is not yet complete; especially is this true in respect to the fungicides. I made an effort the past season to determine the relative value of several fungicides. In my orchard the varieties are planted in rows running east and west. I sprayed the rows north and south, so that the several fungicides were applied alike to all the varieties. I first sprayed four rows on the west side with Paris green and carbonate of copper; the next three rows with Paris green and Bordeaux mixture; the next row I left unsprayed; the next three rows I sprayed with Paris green and sulphide of potassium (liver of sulphur); and the next three rows with Paris green alone. The amount of the several substances used to one hundred gallons of water was as follows:

Paris green, 5 ounces; carbonate of copper, 6 ounces, using carbonate of ammonia as a solvent; sulphide of potassium, 25 ounces; Bordeaux mixture, one-half strength. Three applications were made—the first between the 10th and 13th of April; the second on the 15th and 16th of May, and the third on the 24th, 27th, and 29th of May. My orchard bore very sparsely, many of the varieties not bearing at all. The only varieties which bore so as to make a comparison possible were the Winesap, the Missouri Pippin, and the Willow Twig. The product of one tree of each, under each method of treatment, was carefully examined and counted. Three divisions were made: First, Those perfectly free from scab; second, those slightly affected, but not enough to materially affect their market value; the third class included the remainder, designated as cider apples. The following table gives a condensed view of the result:

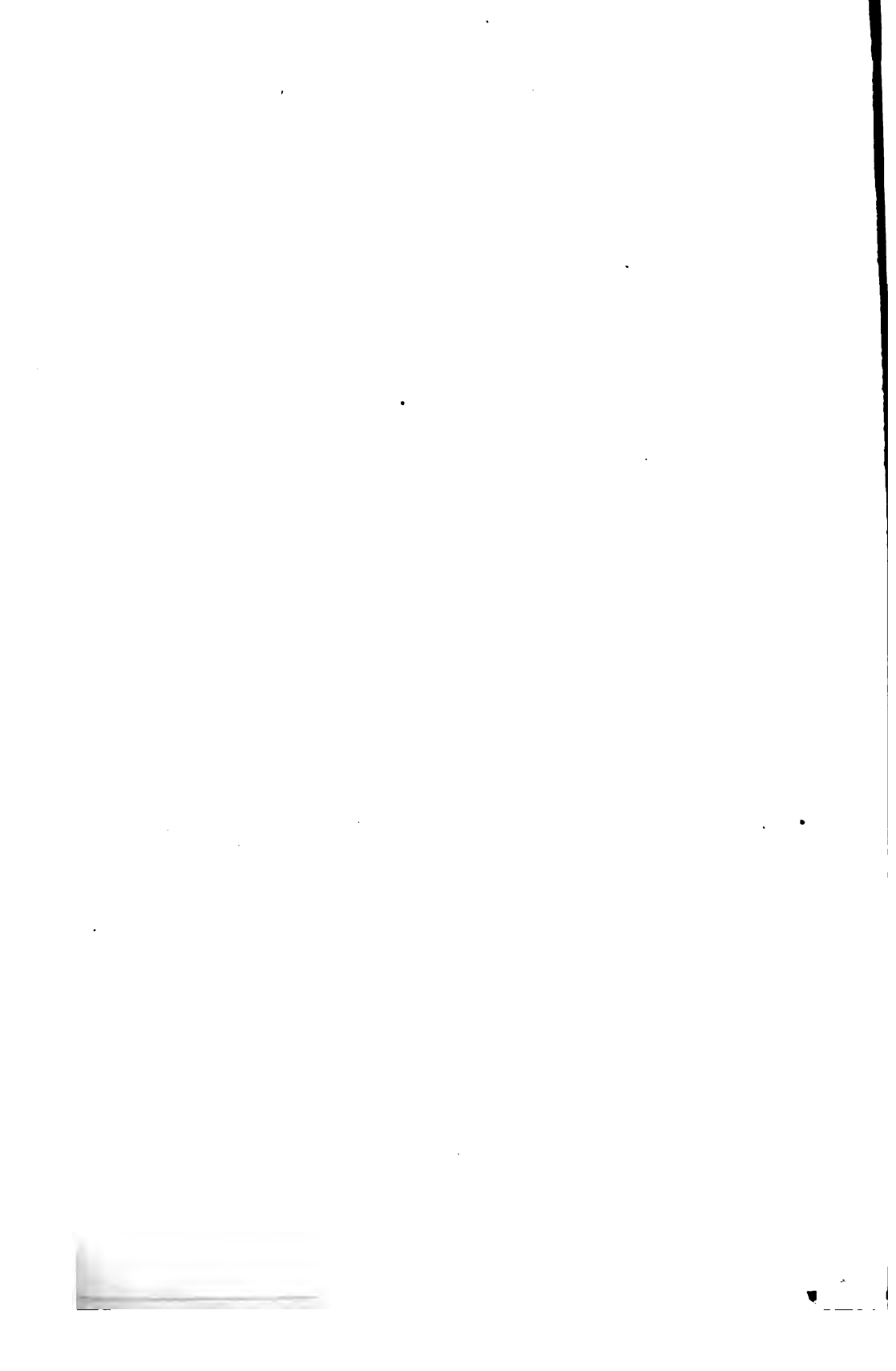
	Per cent. free from scab.	Per cent. mer- chant- able.	Per cent. older apples.	Per cent. wormy.
Winesap sprayed with Paris green and carbonate of copper..	14.5	30.0	54.5	13.5
Mo. Pippin " " " " " "	13.5	18.0	68.0	14.0
Willow Twig " " " " " "	23.5	43.0	33.5	12.0
Winesap sprayed with Paris green and Bordeaux mixture....	16.0	42.0	42.0	35.0
Mo. Pippin " " " " " "	17.0	41.0	42.0	24.0
Willow Twig " " " " " "	26.8	42.6	30.5	50.0
Winesap sprayed with Paris green and sulphide of potassium,	5.0	31.5	63.0	13.0
Mo. Pippin " " " " " "	14.8	42.0	43.0	29.0
Willow Twig " " " " " "	29.5	54.5	16.0	.....
Winesap sprayed with Paris green alone.....	9.0	33.0	58.0	12.0
Mo. Pippin " " " " " "	16.5	35.0	48.0	11.0
Winesap unsprayed.....	6.0	40.0	54.0	13.0
Mo. Pippin " " " " " "	28.0	37.5	34.5	27.0
Willow Twig " " " " " "	21.0	43.5	35.5	.....

As a possible or partial explanation of the unsatisfactory nature of these results, I will state that my first spraying, finished on the 13th of April, was followed, on the 18th and 19th, by a heavy rain; and my last spraying, finished on the 29th of May, was followed, on the evening of the 30th, by a heavy rain, which continued through the 31st. I need not say that these results were disappointing to me. They are wholly negative; they establish nothing. I am still certain that spraying is rational, and that our failures are due to mistakes and coincident conditions, which further experiment and observation will enable us to correct or avoid.

The Society, having finished the work of the session, adjourned *sine die*.

## APPENDIX.





# FRUIT MANUAL.

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The pioneer fruit growers of Kansas have had immense difficulties to contend with, from the fact that the experience of and the rules laid down by no other state or country could be relied on, either as to varieties, cultivation, or treatment, here; and, in consequence, they were under the necessity of groping around in the dark until some light was thrown upon their pathway by the lamp of experience, since which they have made commendable progress. Yet to day the science of fruit growing in Kansas is in its infancy, and any attempt to lay down rules for future use is to some extent hazardous, and may at any time be changed by the experience of coming years; but there is a constant and growing demand for some guide to point out to the coming fruit grower when, where, how and what to plant.

As this Society has been holding meetings for many years, and the members thereof have at these meetings given their experience, reported their successes and their failures, and have discussed the problems brought before them, they feel that they have arrived at some conclusions, and have established some facts, that will be helpful to the fruit growers of Kansas; hence the issuing of this manual.

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## THE APPLE.

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### CHAPTER 1.

**SECTION 1. *Selecting a Site.***—This is the first thing to be considered in planting an orchard; and in doing this there are many things to be considered, which we will take up in their order. The orchard should be planted near the house, so that the owner can have a constant oversight. But few orchards, to our knowledge, planted any great distance from the house have been a success. They are almost sure to be neglected, and go to ruin. We would plant it either behind the house, to the right or left, but never in front. If the house fronts the east, and the barn and other out-buildings are at the back of the house, then put the orchard on the north and the garden on the south side of the buildings, so that the buildings and shade and ornamental trees around them will somewhat break from the orchard the strong south and southwest winds that prevail during the growing season. The orchard would also, to some extent, break the cold northwest winds from the buildings. If the house faces the south, it would be best to set the orchard on the north or back of the house, and it will make a splendid background for the house. If the house faces west, we would also prefer having the orchard back of the house or on the north side. If it faces north, the orchard should be on the east side of the buildings. There are situations where it would be advisable to change the above rules.

**Sec. 2. *Elevation.***—Other things being equal, always choose the highest ground

on the farm, if convenient to the house. What is meant by "elevation" is, that it be high compared with the surrounding lands. The finest fruit, and in the greatest abundance, is generally found on the high grounds. The reason given for this superiority is, that the cold air on still nights, as well as the deleterious gases, settle on the lowlands, and leave the elevations comparatively warmer, and with a purer atmosphere. There are quite a number of orchards now growing and bearing an abundance of delicious fruit on our low, rich, alluvial bottoms; and many of our members claim that eventually these rich bottoms will be the best locations. This is more owing to the character of the soil and protection from winds than otherwise. The higher elevations are the best places for orchards—especially where protected from the winds.

**SEC. 3. Slope.**—The slope on most Kansas prairies is so gradual, that practically there is no material difference; but if other things are favorable, always select a northern slope.

**SEC. 4. Soil.**—There is probably no fruit grown that so universally and completely adapts itself to all kinds of soil as the apple; and Kansas is especially fortunate as to the character of her soil for such purposes. The kind of soil that has generally been considered as giving the best results, is that of our high, rolling prairies, where the surface soil is of moderate depth, the subsoil a red clay, with some sand intermixed, and underlaid with limestone. Yet some of the best orchards in the state are on lands where sand predominates, and are underlaid with sandstone. A perfect soil would be one of a mixture of clay and sand, with clay predominating, both in surface and subsoil, underlaid with limestone near the surface. This kind of soil usually contains an abundance of lime, and a good supply of all the elements necessary to perfect fruit and tree growth, and abounds in this state.

**SEC. 5. Drainage.**—This subject requires less attention in Kansas, probably, than in any other state. Our high, rolling prairies are mostly underlaid with limestone, and this stone comes so near the surface, and is so full of cracks or seams, that no other drainage is necessary; yet orchards planted across "draws," or low places that are too wet, would be improved by underdrains.

**SEC. 6. Wind-breaks.**—The members of this Society agree that wind-breaks are needed around the orchard, especially on the south and west sides; but mistakes heretofore have been made in planting them too near the orchard, and too close together in the rows. Fruit trees need and must have an abundance of light and air, to perfect good fruit. Trees for wind-breaks should not be planted less than five rods from the orchard, and not less than 8 or 10 feet apart in the row. Three rows are sufficient on the north and east sides, and six rows on the south and west sides. High, rapid-growing trees should be planted, to break the force of the wind, but at the same time not to prevent a free circulation of air through the orchard.

## CHAPTER 2.

**SECTION 1. Planting.**—The first thing to consider under this head is the time of planting: Shall it be in the fall or spring? The Society has been divided on this question. Those advocating fall planting claim that the roots partially heal over during the winter, and the earth settles firmly around them, so that the tree is in better condition for early spring growth. Those practicing spring planting say that it is difficult to get the earth well packed around all parts of the roots in the fall, and in consequence they are liable to be damaged by freezing and thawing, and that the high winds switch them about while the ground is frozen, by which they are injured; while if taken up in the spring and immediately set out, they start to grow

at once, and are less liable to be injured. Another plan is, to take up the trees in the fall, heel them in, and plant in the spring. A digest of the discussions on this subject furnishes the following conclusions: First, that fall planting is successful if the earth is well and thoroughly packed around all parts of the roots, and the earth well banked up around the tree, so as to hold it firmly in place. Second, that taking the trees up in the fall and heeling them in, and planting in the spring, can be made successful if the heeling is well done. To do this, the bundles should be opened and each tree put in separately, and the earth well packed around the roots; or, a still better plan is, to put them in trenches, with the roots entirely below frost, and the tops partially covered. But the general tree planter had better take up the trees in the spring, and plant as soon thereafter as possible.

SEC. 2. *Distance Apart.*—There is a wide divergence of opinion as to the distance trees should be set apart—ranging from 12 to 40 feet. Those advocating close planting claim that the trees make wind-breaks for each other, and economize ground; that the fruit grown from the trees before they are large enough to crowd each other will amply pay for the extra amount of trees and work; and that when the trees begin to crowd each other every alternate tree can be removed. The advisability of extreme close planting depends largely upon the kinds planted. Early-bearing varieties, such as Winesap, Cooper's Early White, Missouri Pippin, etc., probably will pay to plant close, as they come into bearing, if properly treated, in four or five years, and four to six crops can be grown before they need thinning. Another plan of close planting is, to set them 12 to 16 feet north and south, and 30 to 40 feet east and west. This plan has been practiced by some apple growers with success, and has some advantages. The trees, being planted close north and south, will soon shade each other, and thereby prevent sun scald, and at the same time will to some extent break the force of the south and southwest winds that lean so many trees to the northeast; and, being planted wide apart east and west, the roots and tops will have room to spread. There is still another mode of close planting that has some advocates, and has been practiced in some localities, viz., planting the main orchard trees 30 to 40 feet apart each way, and then planting peach trees midway between the apple trees. The peach, being a short-lived tree, is grown, has performed its mission, and is ready to cut down in its old age, by the time the apple trees are grown large enough to need the space. However, the wisdom of this mode of planting is doubtful. The peach is a gross feeder, and exhausts the ground very rapidly. There is still another plan for close planting that has some merit, which is, to plant the main orchard the desired distance apart; then plant midway between rows of early-bearing varieties of apple trees, these to be cut out when they begin to crowd. But close planting in any shape is not recommended; it exhausts the soil too rapidly and, when the time comes to thin out, few men possess the nerve to cut down rows of fine, thrifty young trees that required years to grow, and in most cases they would be left standing until the orchard is badly injured. Thirty feet each way is as close as they should be set.

SEC. 3. *Laying off the Ground.*—The usual mode of laying off is to measure across the ends, and set stakes for each row; then measure or sight across the inside, set a peg where each tree is to stand, and proceed to dig the holes. These holes, experience in Kansas has demonstrated, need not be any larger than is necessary to receive the roots spread out in their natural shape, and deep enough to get the tree down about as deep as it was in the nursery. In light, sandy soil it can be put some deeper, but in clay or heavy soil it should never be set deeper than it stood in the nursery. Several members have for the past 10 years been planting their orchards in the following manner, and it has more advantages than any yet recommended: First, procure a half dozen or more stakes four or five feet high; set these stakes in

line where you want the south row of trees; then, with a steady team, plow and mark out a straight furrow in range with the stakes; have a man follow after and measure the distance for the next row to the north, and set the stakes; then mark out as for the first row; and so on till the north side of the plat is reached. Then set the stakes north and south one foot east of where the east row of trees is wanted. Begin at the south end, and mark out a furrow in line with the stakes, throwing the furrow to the east; turn back, letting the near horse walk in the furrow; run another furrow parallel with the first one, and about 20 inches west of it; make one more round, and throw out the center, thereby making a dead furrow where the first row of trees is to stand. Repeat this operation until the west side of the plat is reached. If a good, stout team is used, this will give a dead furrow running north and south where the rows of trees are to stand, 20 to 24 inches wide and 8 to 10 inches deep, which is about the right depth to plant trees. This completes the laying off, and the preparation of the ground for the reception of the trees. Nothing further need be done, except to go along with a shovel and throw out any loose dirt that may have fallen back where the east and west rows cross, or where the trees are to stand.

**Sec. 4. *Selecting the Trees.***—Having determined on the location, prepared the ground, and made out a list of the kinds to be used, with a team, and a good supply of wet straw, hay or coarse manure in the wagon, drive to the nearest reliable nursery, and select good, thrifty two- or three-year-old trees. See to taking them up. Remove all borers, cut off all haggled roots, trim the tops into the desired shape, and pack them into the wagon, with plenty of wet straw around the roots. Drive into the intended orchard plat, and set them out as unloaded.

**Sec. 5. *Planting.***—Let one man take a tree, set it in the dead furrow where the east-and-west furrows cross, and spread out the roots to their natural shape; have another man throw on a few shovelfuls of well-pulverized surface soil, seeing that this is well packed around the roots; then let the man holding the tree tramp the soil well around it while the other man fills up, till the earth is about level with the surface of the ground. The tree when planted should lean somewhat to the southwest. It is best to plant the trees of each variety together.

**Sec. 6. *Cultivation.***—The first summer after planting is a critical time for the trees, and they should receive great care. The ground should be kept clean and well cultivated the entire season. The first thing to do in cultivating an orchard should be, to provide short double and singletrees. The doubletrees should not be over 25 to 30 inches long, and the singletrees not over 16 or 18 inches. Make them as short as the team can be made to work with, and always use them when cultivating. With a little care there is no need of barking the trees. If the trees are planted in dead furrows, as above described, soon after they are planted close up the dead furrow with a plow. This completes the first cultivating. In 8 or 10 days, or when the weeds begin to start, plow the ground again, throwing the furrow to the trees, and running the plow not more than two or three inches deep, going about four rounds to each row of trees. Repeat this three or four times during the season, or as often as the weeds start, running the plow a little deeper each time. This gradually deepens the earth around the trees as the season advances, and by fall we have a deep, mellow bed, about 8 feet wide and 12 to 16 inches deep. All weeds that are not covered by the plow should be cut out with the hoe. On the ground between the rows of trees plant crops that require cultivation, such as corn, potatoes, beans, etc. Corn is the best crop, as it receives cultivation at the time when the trees need it, and affords to some extent protection to the trees from the wind. The second year, commence cultivation by throwing the furrow from the trees, and the next time to them, and so on, keeping the ground clean and well stirred till about the middle of July, when cultivation should cease for the season. Stirring the ground later than

this stimulates fall growth, which does not have time to ripen up well, and is liable to winterkill. The third, fourth and fifth years, cultivate the same as the second year, and by this time, if the trees have been well cared for, the early-bearing kinds should begin to fruit. The discussions show that the Society is divided as to the treatment of the soil after the tree comes into bearing. Some members practice clean cultivation, with no crop of any kind, while others seed the orchard down with clover, plowing the clover under every second or third year. Which of these modes is best is not decided. So far, both have been successful.

**SEC. 7. Pruning.**—Pruning is a necessity, but there is a difference as to the amount needed. There has been damage done to apple trees in this state by injudicious pruning. The system of pruning should commence when the trees are quite young, in the nursery, say at one year old, by trimming to one upright shoot, keeping the body clean up to where the head is desired. Just how high the head should be, members differ to some extent, ranging from one to three feet from the ground to the first limbs; but all agree that a low head is one of the essentials of a successful orchard in this state. If the top of the tree is formed high, the strong southwest winds are almost sure to lean it to the northeast, and sun scald on the southwest side of the body is almost sure to follow; whereas, if the head is formed low, the tree is not liable to lean, and if it does, the low head in most cases will shade the body. Low-headed trees bear fruit more regularly than high ones; in fact, some years the lower limbs are loaded with fruit, while the upper branches have but little. The nurseryman should form the heads of trees low, ranging from one to three feet, and urge upon his customers the necessity of using such trees. In the old orchards of the state, where the heads are formed low, not one in a hundred is sun scalded, and where the heads are five to seven feet up from the ground, half or more are scalded, and many are killed outright. If the nurseryman has performed his duty, and trained the head into proper shape, and a tree digger is run under the trees before taking up, but little pruning will be needed at the time of transplanting, as the tree digger only cuts off the tips of a portion of the roots; especially is this the case where the trees are transplanted at two years old. The tree digger should always be run under them when two years old, whether they are transplanted or not, and again run under when taken up. Trees that are taken up with the tree digger are worth much more than when taken up with the spade. The roots are cut a uniform length, and are never haggled or bruised. If the digger is run under at two years old, and they are allowed to stand until they are three years old, it checks the too-rapid growth of the top, and forces the formation of all the fibrous roots immediately around the tree, and when transplanted they are taken up with the tree. After the orchard is planted, the trees should be watched for the first four to six weeks, and any trees that show signs of dying can sometimes be made to grow by cutting back the top. But this class of trees should be replaced with good ones from the nursery the next season. During the first summer after planting but little cutting need be done, except to keep the water sprouts off. The second year, begin to form the head of the tree, by encouraging the growth of one upright center shoot, with side branches every six or eight inches, cutting out all intermediate branches. Keep up the system each year thereafter. Be careful to so shape the tree that when it is grown no large branches need to be removed. When the trees come into bearing, do as little pruning as possible immediately after they have borne a heavy crop of fruit, or when they are exhausted. Two objects are to be gained in pruning: first, to form the tree into the desired shape; second, to so form the head as to let as much light as possible into all its parts. Nature should at all times be allowed, as far as possible, to do the work of forming the tree into shape, and interference with her work

often does more harm than good. Some varieties have upright, close-growing heads, while others are spreading and irregular. Each kind should be allowed to form the head in its own way as far as possible.

### CHAPTER 3.

**SECTION 1. Necessary Tools.**—In gathering apples, as in doing any other work, it is necessary to have the right kind of tools to work with. The first thing in this line is a rig for the wagon suitable for hauling apples. For a wagon rig, make a platform 40 inches wide, 14 feet long, of 2-inch plank, with 2x4-inch crosspieces underneath, at each end and in the middle, with a 4-inch bolt through each plank where it covers the crosspiece. Put it on the wagon and make a notch to fit the standards. This platform is the best wagon rig for hauling barreled apples upon. It holds two barrels side by side, and 16 barrels can be loaded on it with ease; is very convenient in loading and unloading, and has considerable spring to it. When the wagon is loaded, put a pin or stake in the rings of the standards, and slip a common fence board between the stakes and barrels; this keeps the barrels from tipping. Now tie a rope across, behind and before, and it is in shape to be hauled anywhere with safety.

**SEC. 2. Sorting Box or Table.**—For sorting apples, use a shallow box three feet wide by four feet long, and four to six inches deep. This box can be set on a couple of barrels, or legs can be put to it. Tack a piece of old carpet or piece of heavy cloth on the bottom, so the apples will not bruise while being poured in, and the sorting table is complete.

**SEC. 3. Picking Sacks.**—Take a common seamless sack, put a hoop in the mouth to hold it open, then tie the bottom and top together, and throw it over the shoulder in same manner as for sowing grain. These sacks are fully as convenient for picking apples from the trees as a basket, and the fruit is bruised less.

**SEC. 4. Ladders.**—The ladder for getting up into trees should be about 12 feet long, two feet wide at the bottom, and tapering to a point at the top; made of 1x4-inch pine for the sides, and good, tough hickory for the rounds. This makes a good, strong ladder, easily handled, and can be run up into the tree anywhere.

**SEC. 5. Barrel Press.**—The barrel press consists of a piece of oak, 4x4, 20 inches long, with a common inch bench screw running down through the center. On the ends are bolted flat iron rods; these rods run down, and have hooks on the lower ends, so as to catch onto the under side of the barrel. This press is used to press the heads into barrels after packing.

**SEC. 6. Barrels.**—Barrels are the best of all packages in which to handle apples, and the sooner they are packed into them after picking, the less liable they are to injury; hence is recommended packing in the orchard. The flour-barrel size for apple barrels, 28-inch stave and 17½-inch head, is the best. A barrel of this size holds about three bushels, and is fast becoming the standard size all over the West. These barrels are made in large quantities by machinery, and are furnished in what is called "knocked-down" shape; that is, the staves are cut the right length, width, and thickness, and beveled. The heads are turned the right size; hoops are cut, and put up in coils; and all are tied up in suitable packages for handling or shipment. With the material thus furnished, a good cooper will set up 30 to 50 per day, and any man handy with tools can soon learn to set them up. A supply of barrels should always be provided before picking time commences.

## CHAPTER 4.

**SECTION 1. *Time to Gather.***—The time to gather most varieties of apples is when they have attained their full size, and are well colored. Some kinds, that hang on well and are intended for immediate use in the family, may be allowed to stay on the tree until fully ripe. But where they are intended for shipment or storing away they must be picked before they get mellow, or they are sure to be injured in handling, and will not keep.

**Sec. 2. *Picking.***—Having everything ready, and the fruit being at the right stage for picking, move the outfit into the orchard, setting the sorting table in the center of a block or group of trees. The pickers gather the apples one by one from the trees, putting them into the sack, and when about a half bushel is in the sack, empty them upon the sorting table. When all are picked within a reasonable distance, move to the next block, and so on. When the apples are hard to pull, give them a little twist while pulling. If the trees are reasonably full and the fruit of fair size, each picker ought to average 50 bushels per day.

**Sec. 3. *Sorting.***—As the apples are picked and emptied upon the sorting table, one or more hands should do the sorting and packing. They should be sorted into four grades, the first embracing all good, sound fruit above a certain size—say about seven inches in circumference; this grade pack into the barrels. The second grade should consist of all above that size that are bruised or damaged in any way; this grade can be evaporated to advantage, or can be made into cider, apple butter, vinegar, or jelly. The third grade should contain all sound fruit below the first size named; this can be worked into cider, jelly, or vinegar. The fourth grade should embrace all rotten apples, and should be fed to the hogs.

**Sec. 4. *Packing.***—Set the barrel near the sorting table in the orchard, and take out one end; select good, fair, average, uniform sized apples for “facers;” put these in the bottom of the barrel, in layers, stem end down, and pack close together; put in two layers; then fill up the barrel, shaking it well while filling, and rounding up about one inch above the chime; apply the press, and force the head into place; drive down the hoops, and nail in the “liners;” drive four to six four-penny nails through the upper hoop into the head; see that all the hoops are nailed so they will not slip off; turn the bottom end up, and nail and line this end, and mark the name of the variety and proprietor on it; remembering always that this is the opening end. This completes the packing, and the apples are ready for sale or shipment. An apple has a certain amount of “give” or “spring” in it, and it can be pressed to that amount without bruise or injury, and when so pressed into the barrel it can be rolled about or handled without injury. Whenever in handling they are found to be loose in the barrels, and are shaking about, the barrels should be immediately opened, and the fruit repacked, or it will be ruined.

**Sec. 5. *Gathering for Storage.***—When the apples are intended for storage, it is not necessary to pack in barrels. Boxes 2 feet long, 16 inches wide and 8 inches deep, sides and bottom made of half-inch and the ends of inch lumber, with holes cut in each end for “hand holes,” make excellent receptacles with which to handle apples in the orchard. These boxes hold about one bushel, and can be set on the platform of the wagon, and taken into the orchard and filled by the pickers while on the wagon; and where the fruit is scattering, this is the most convenient way to gather it, even for packing. It can be hauled to some central point for packing, or to the place of storage, and can be sorted from the boxes nearly as well as from the sorting table. These boxes cost much less, and will last longer, than bushel baskets, and are equally as handy; and when enough of them are made, they are an excellent thing in which to store away the apples.



SEC. 6. *Fruit House*.—A vast deal of time and thought has been spent in deciding upon a good place for storing fruit. A large per cent. of our most delicious kinds are so perishable that they last but a short time. The apple, however, with proper treatment, with our early and late varieties, and a good fruit house, can be kept in good condition the year around. A fruit house must be built of such material, and the walls of sufficient thickness, as will keep out frost. Brick, stone and wood are the materials nearly always used. Either answers the purpose; wood is the best non-conductor. They can be put under or above ground. Cellars under buildings are most in use. They should be so arranged that the temperature can be regulated at will. Experience has demonstrated, time and again, that fruit keeps best, and undergoes less changes, when the temperature is kept just above the freezing point; and the fruit house that can be kept at this point will answer all purposes. There are two ways to do this: One is to keep a sufficient quantity of ice in the building to keep the temperature down to the desired point; and where large quantities of fruit are kept, this is undoubtedly the best plan; but with most fruit growers this is not practicable. Second plan: The varieties intended for keeping are generally picked in October, and by this time the nights are cool; and after the fruit is put in, the doors, windows or ventilators should be kept open at night, so as to give free circulation to the air in all parts. This will cool off the fruit and the inside of the building or cellar, and if shut up in the morning will retain a low temperature all day. Of course, when winter sets in, it will be necessary to keep it closed most of the time; but, by a little care, the temperature in this way can be kept down to nearly the desired point the greater part of the time.

SEC. 7. *Storing Away the Fruit*.—It is not material just how the apples are stored away. They can be stored in bulk, in barrels, or in boxes. If stored in bulk, the piles should not be too large, as they will generate some heat. Some fruit men practice storing apples in sheds, outhouses, or on the north side of a building, or in any cool place where there is a free circulation of air, and leaving them there until the weather becomes cold. This plan works well, but requires unnecessary handling, and sometimes they are left too long, and are caught by the cold.

SEC. 8. *List of Varieties of Apples Recommended for Planting in Kansas*.—(See Voted Fruit List, in this volume.)

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## THE CHERRY.

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This fruit has become a general favorite throughout the state. Its easy culture, hardiness and heavy productiveness of the tree, and the value of its fruit for general uses, have caused a large planting in Kansas. It thrives quite well on either high or low lands, and on sandy and loamy soils. The Morello family is highly successful wherever planted, and embraces the sour varieties, Early Richmond, Kentish, Montmorency, English Morello, and common red (black) Morello. In some localities the finer-flavored varieties, as May Duke, Governor Wood, Royal Duke, Belle Magnifique, Belle de Choisy, Reine Hortense, are quite successful. The class known as "sweet varieties" do not succeed. The tree often becomes fatally injured by the intense heat of summer and the extremes of winter weather.

The main requisites in successful culture are deeply prepared and enriched land, where not so by nature, and a vigorous wood growth. Whenever a tree becomes stunted by neglect or from sterility of the land, decay soon sets in at the heart, and death generally follows in a few years.

## CHAPTER 1.

**SECTION 1. Site,** for this as well as for all classes of soft fruits, should be as near the dwelling as practicable, for convenience is gathering the fruit and general care of the orchard.

**Sec. 2. Elevation.**—High lands are preferable, as the fruit buds are less liable to be injured by spring frosts, and the tree maintains a normal condition better, through varying weather in winter, and better facilities are afforded for circulation of the currents of air during extreme rainfalls and sudden changes in temperature.

**Sec. 3. Slope.**—An eastern or northern slope is preferable, as trees do not suffer so much from droughts or heat of sun on such locations. The slope should be sufficiently inclined to readily pass off any sudden, heavy fall of water, as a retention of a surplus amount in the land will weaken the vigor of trees, and where continued endangers their lives.

**Sec. 4. Soil.**—A deep loam and a sandy soil are to be preferred; but other soils can be made suitable by deep tilling and manuring, and, for naturally-arid land, a heavy mulching.

**Sec. 5. Drainage.**—When planted on flat lands, some artificially-constructed drains must be provided; but on slopes water is seldom retained in amount that would be deleterious to trees. The value of ample drainage is forcibly impressed on the grower when heavy and continuous rains flow the land just at the ripening period, which is invariably followed with cracking and often bursting of the fruit, thereby rendering almost the entire crop unmarketable, and a serious loss. No such an occurrence would follow on well-drained grounds.

**Sec. 6. Wind-breaks.**—In open prairie lands wind-breaks are an advantage, when confined to the south side only. These should be constructed with two rows eight feet apart, and the trees set at same distances, alternating in the row.

## CHAPTER 2.

**SECTION 1. Preparation of the Land.**—Deep plowing and pulverizing of the surface and stirring of the subsoil are as much needed with the cherry as any of the orchard fruits. The depth can be obtained by a repeated following in the same furrow, until the desired condition is reached. Sterile lands must be well enriched with barnyard manure or wood ashes, or any well-rotted vegetable matter, before planted.

**Sec. 2. Selecting of Trees.**—These should never be over two years old; strong, vigorous growers, and well rooted. A second-class tree is never cheap, and their use is a very questionable economy; better plant fewer trees of the first class than use them on account of the difference in the cost. As to the character of stock on which the kind has been worked: Of these there are three kinds, viz., Mahaleb, Mazzard, and common Morello. To these the objections have been made that the Mahaleb is short-lived, Mazzard not at all times hardy, and the Morello sprouting profusely from the root. The tendency of the remarks and discussions at the meetings of the Society have been towards the Morello as a preferable stock, claiming early and profuse fruiting and hardiness over the other classes. To the use of this stock the main objection comes from nurserymen; and in addition to the above-stated objection, that it is difficult stock to work. While there is no question as to the hardiness and abundant fruitage of those trees worked on this stock, one of the most valuable orchards in the state was table grafted on the Mazzard stock. The continuous annual yield, and longevity and vigor of the trees, have been re-

markable. But many of these conditions undoubtedly can be clearly traced, and are due to unexceptionally kind treatment given annually to the orchard, and more credit is due to this treatment than to the class of stock used.

SEC. 3. *Laying off the Ground.*—The usual method of laying off is, to measure across the ends, and set stakes for each row; then measure or sight across the inside, set a peg where each tree is to stand, and proceed to dig the holes. These holes, experience in Kansas has demonstrated, need not be any larger around than is necessary to receive the roots spread out in their natural shape, and deep enough to get the tree down about as deep as it was in the nursery. In light, sandy soil it can be put some deeper, but in clay or heavy soil it should not be. Several of our members have for the past 10 years been planting their orchards in the following manner, and we consider it as having more advantages than any yet recommended: First, procure a half dozen or more stakes, four or five feet high; set these stakes in line where you want the south row of trees; then, with a steady team, plow and mark out a straight furrow in range with the stakes; have a man follow after and measure the distance for the next row to the north, and set the stake; then mark out as for the first row; and so on until the north side of the plat is reached. Now set the stakes north and south one foot east of where the east row of trees is wanted. Begin at the south end, and mark out a furrow in line with the stakes, throwing the furrow to the east; then turn back, letting the near horse walk in the furrow; run another furrow parallel with the first one, and about 20 inches west of it; make one more round, and throw out the center, thereby making a dead furrow where the first row of trees is to stand. Repeat this operation until the west side of the plat is reached. If a good, stout team is used, this will give a dead furrow running north and south where the rows of trees are to stand, 20 to 24 inches wide and 8 to 10 inches deep, which is about the right depth to plant trees. This completes the laying off, and the preparation of the ground for the reception of the trees. Nothing further need be done, except to go along with a shovel and throw out any loose dirt that may have fallen back where the east-and-west rows cross, or where the trees are to stand.

SEC. 4. *Distance Apart.*—The cherry tree is a close grower, forming either an upright or low, round head, according to varieties. In either case it requires little room. But for convenience in cultivation and other work in the orchard, the rows should be 20 feet apart, and trees 15 feet in the row.

SEC. 5. *Planting.*—First, time for planting: Many trees fail because planted too late in the spring, and many more fail because planted in the fall. The safest time is in the spring, and it should be done as soon as the winter's frost has left the ground, and without fail before the buds become swollen. Let one man take a tree, set it in the dead furrow where the east-and-west furrows cross, and spread out the roots to their natural shape; another man to throw on a few shovelfuls of well-pulverized surface soil, seeing that this is well packed around the roots; then let the man holding the tree tramp the soil well around it while the other man fills up, till the earth is about level with the surface of the ground. The tree when planted should lean somewhat to the southwest. It is best to plant the trees of each variety together.

SEC. 6. *Cultivation.*—The first summer after planting is a critical time for the trees, and they should receive great care. The ground should be kept clean and well cultivated the entire season. The first thing to do in cultivating an orchard should be to provide short double and singletrees. The doubletree should not be over 25 to 30 inches long, and the singletrees not over 16 or 18 inches. Make them as short as the team can be made to work with, and when cultivating always use them. With a little care, there is no need of barking the trees. If the trees are planted in dead furrows, as above described, soon after they are planted close up

the dead furrows with a plow. This completes the first cultivating. In 8 or 10 days, or when the weeds begin to start, plow the ground again, throwing the furrow to the trees, and running the plow not more than two or three inches deep, going about four rounds to each row of trees. Repeat this three or four times during the season, or as often as the weeds start, running the plow a little deeper each time. This gradually deepens the earth around the trees as the season advances, and by fall we have a deep, mellow bed about 8 feet wide, and 12 to 16 inches deep. All weeds that are not covered by the plow should be cut out with a hoe. On the ground between the rows of trees we would plant crops that require cultivation, such as corn, potatoes, beans, etc. Corn we regard as the best crop, as it receives cultivation at the time when the trees need it, and affords to some extent protection to the trees from the wind. The second year, commence cultivation by throwing the furrow from the tree, and the next time to them, and so on, keeping the ground clean and well stirred till about the middle of July, when cultivation should cease for the season. Stirring the ground later than this stimulates fall growth, the wood of which does not have time to ripen up well, and is liable to winterkill. The third, fourth and fifth years, cultivate the same as the second year, and by this time, if the trees have been well cared for, they will have become well established in fruiting. After this, if cultivation is not continued, the land should have each year a liberal dressing of stable manure and litter. Cherry trees must be kept in a vigorous, growing condition each year, and if such varieties as adapt themselves to our climate are used there will be but few failures until their natural time of life is run.

**Sec. 7. Pruning.**—It is generally conceded by all progressive orchardists that pruning is a necessity, the only difference being as to the extent. The main points to be gained in this work are: First, a low and uniformly-shaped head; second, to facilitate the penetration of light and air to the inner portions of the head; third, to encourage and direct the annual growth so as to form a shade sufficient to break the force of the sun's intense heat upon the branches and trunk of the tree; fourth, to remove all chafing, straggling and succulent growth. It should be done mainly while the tree is young, and in the spring before the buds break into leaves. Succulent growth should be removed as soon as it appears.

## CHAPTER 8.

**SECTION 1. Necessary Tools—Ladders.**—Of these the only convenient form is the common adjusting folder, which is easily manufactured by using for the sides two-inch pieces of common lumber, 6 inches wide and from 6 to 10 feet long, as occasion may require. Into these are grooved steps of same width, at easy stepping distances, fastened with nails or screws, each supported by cleats on the under side. The top should be constructed with a platform step, eight inches wide, on which to rest the picking boxes and for the picker to stand upon whenever necessary. This style is found at almost any store dealing in hardware or agricultural implements, and is generally used while the trees are young and low headed. As the trees become large and tall, the staging platform is far the best. This is constructed on the plan adopted by plasterers for the finishing of inside work in buildings, viz.: Two wooden horses are made of the required height for convenience of the pickers, and placed at safe distances apart along the sides or under the branches of the trees, and on their tops is constructed a platform, where one or more pickers may stand and do the work. These have the advantage of accommodating several persons at a time, are movable, and easily shifted from place to place.

**Sec. 2. Picking Crates.**—These are made of light but strong material, and of necessary size to receive four common berry boxes side by side. This crate is sus-

pended to the picker, adjusted to a convenient position in relation to the work and in front of him, thus relieving both of his hands to be used in picking.

SEC. 3. *Boxes and Crates.*—The common style which is used for berries is well adapted to use in gathering a cherry crop.

SEC. 4. In an orchard of any extent a small shanty or packing room should be provided. It will also be found convenient for storing the fruit against exposure, as well as shelter for the pickers from a sudden rainfall. In this may be constructed a facing and packing table.

## CHAPTER 4.

SECTION 1. *Time to Gather.*—If for shipping, the best time will be when wholly covered with a light-red color—approaching scarlet; if for a near market, then a dark-red color.

SEC. 2. *Picking.*—Having everything ready, the picking force should be divided into two classes. The first proceeds to gather all the fruit within easy picking distance while standing on the ground, and should keep in advance of the second class, which works from ladders or staging, and cleans up the tree. Cherries must be picked by the stem, and not by taking hold of the fruit, and care must be taken not to even start the stem from the fruit, for if that occurs the juices will flow out, and all such fruit will quickly spoil. None but sound and ripe specimens should be placed in the boxes, and the top layer in every box should be an honest index of the whole. With the "picking crate" swung to the picker, he has every facility for doing his work well, and quickly detecting any damaged or inferior fruit before it is picked. As soon as the boxes in the picking crate are filled, they are taken out and placed in a shipping crate, and others put in their place; and the crate, when full, carried to the facing table.

SEC. 3. *Facing and Packing.*—The first consists in turning the stems of all fruit in the top layer down, which will give the appearance of a solid surface to the box. All boxes should be filled a little above their edges, to avoid the semblance of stinted measure, and provide for the inevitable settling sure to follow the racket of transportation. As fast as faced, pack them in the shipping crate, the best being the 24-box crate, close up securely, brand with name of variety, and name of grower and consignee, and send to destination at once. This fruit is never so attractive as at the time when taken from the tree, and the sooner it is placed in the market the more readily it will sell. The practice of facing, above described, is receiving severe criticisms in some prominent circles, as offering too great temptation to dishonest conduct.

SEC. 4. *Storage, for the Purpose of Holding.*—The product can be safely held in a cold storage for several days, but must be quickly used when taken out; and especially is this an advantage to the grower in seasons when the yield is abundant, and the market overstocked.

SEC. 5. *List of Varieties Recommended for Planting in Kansas.*—(See Voted Fruit List, in this volume.)

## THE GRAPE.

The grape finds a home in Kansas. Nearly all varieties, both new and old, are successfully grown in some portions of the state. But not all soils or locations are adapted to all varieties; hence a judicious care must be given to selecting of lands, with regard to their adaptation to the varieties intended to be used.

There is no home so small, no dooryard so crowded, but will afford ample room for one or more grapevines, which may be trained on the porch or even the gable end of buildings. Their roots will follow down the cellar wall, or occupy the ground under the porch floor, and thrive.

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## CHAPTER 1.

**SECTION 1. Site.**—A vineyard should not be planted too near the poultry yard or a timber lot, because of the liability to destruction of its crop of fruit by poultry and birds.

**Sec. 2. Elevation.**—High lands are preferable, as such oftener escape late spring or early autumn frosts, and afford the needed circulation of air among the vines, which to some extent will avert the tendency of the fruit to rot. On such lands the wood matures best, and the fruit is of the best quality.

**Sec. 3. Slope.**—A southerly- or easterly-sloping location is preferable. A northern slope will produce the finest-appearing fruit for market, but not the best in quality.

**Sec. 4. Soil.**—It should be of an ordinary fertility, and such as would yield a fair crop of corn. Gravelly and sandy soils having a loose subsoil are preferable; rich, loamy lands are objectionable.

**Sec. 5. Drainage.**—All soils retaining a surplus of water should have drainage, both of the surface and subsoil.

**Sec. 6. Wind-breaks** are not essential to the success of a vineyard, excepting on the western prairies, for a protection from sweeping winds, and to prevent the snow from being swept off the land, as it forms an excellent protection to the roots of plants.

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## CHAPTER 2.

**SECTION 1. Preparation of the Ground.**—Deep plowing of the surface, and stirring of the subsoil to the depth of 15 or 18 inches, are essential. This, followed by thorough harrowing, will place the land in proper shape for planting.

**Sec. 2. Planting.**—Springtime is generally preferred, and not until the ground has become warm. This will occur generally between the 1st and 15th of April.

**Sec. 3. Distance to Plant.**—Slow-growing vines, like the Delaware, do not require as much space as the Concord. Therefore, the character of the plant to be used should govern the distance. For a general rule, the distance may range from seven to nine feet for the rows, and the same for plants in the row.

**Sec. 4. Laying off the Ground**—Stake off the land in rows, at the distances apart desired, and with a plow open a furrow along the line of stakes, until the desired depth for planting the vines is obtained. Then stretch a line across the plat in an opposite direction, and at the point of crossing each furrow set a vine.

**Sec. 5. Selection of Plants.**—A strong one-year-old, having a good supply of fibrous roots, is preferable.

**Sec. 6. Planting.**—The vines should have their tops cut back to only two buds, all bruised and damaged portions of roots removed, and kept moistened and protected from exposure to winds and sun while planting along the line at the crossing of the furrows. All roots must be spread out in a natural position, covered with well-pulverized dirt, and filled up well around the plant and tramped down. In sandy soil set the vines deep; in clay lands it is best to plant shallow.

**Sec. 7. Cultivation.**—The first year it should be thorough, and the ground kept free from weeds, but should cease by July 1. Some vineyardists grow crops of beans, cabbage, potatoes or tomatoes between the rows, to utilize the ground, and

partly compensate for the expense of culture, while others discountenance any use of the land.

**Sec. 8. Pruning.**—In the eastern portion of the state trimming may be done in early spring, and before the sap has started to flow, while in the western part of the state fall is recommended, and as soon as the vine casts its leaves, by removing all of the cane to the two or three buds nearest the ground, and then covering the plant with straw or dirt. The following spring remove all the canes excepting two or three of the strongest, which should be tied to stakes. The following spring one cane, about three feet long, may be left on all strong vines for fruiting, but all the weak ones should be treated in manner recommended for the previous spring. Young vines must not be allowed to overbear, for an injury may occur from which the vines may never recover. For the following year each strong vine may be permitted to carry two canes, out back to four feet in length.

**Summer Pruning.**—As the "forms" (fruit clusters) appear, pinch off the shoot about one joint beyond the last "form;" also remove all weakly forms and shoots, excepting three or four of the strongest, which are for the next year's bearing canes. They are to be treated the following spring the same as recommended for the spring of the third year, and the old canes removed.

**Sec. 9. Trellising and Training.**—Trellises should be constructed in the spring of the third year, by getting the material onto the ground during winter, and the posts sharpened. As soon as frost leaves the ground they can quite easily be driven, and are much firmer by this process than can be made by setting in a hole with the earth tamped down around them. The post at the end of each row should be heavy, and well braced, to resist the strain of the wires when stretched upon them. The lower wire should be at least three feet from the ground, and each of the others above it one foot apart. On these the canes should be fastened in fan shape, and to each of the lower wires.

## CHAPTER 8.

**SECTION 1. Handling the Fruit.**—As the fruit will keep but a short time, it should be marketed as soon as ripe, and packed in the common grape baskets, which may be of different sizes, for convenience of customers. Before packed, all defective berries should be removed, and clusters then placed with the stem downward. If for a distant market, they must be picked before fully ripened.

**Sec. 2. Varieties Recommended.**—(See Voted Fruit List, in this volume.)

## THE PEACH AND NEOTARINE.

### CHAPTER 1.

**SECTION 1. Selecting a Site.**—For the northern sections, we would recommend a sheltered location on the north or northeast of a wood or hill, for the purpose of averting the danger of trees and fruit buds being killed in winter or by late spring frosts. For sandy soils, an open, elevated site is preferable, to admit of a free circulation of air.

**Sec. 2. Soil.**—The peach thrives best on a loose, dry soil, well underdrained, naturally or artificially, and reasonably enriched with decayed organic matter. Such as is well adapted to the growth of corn is equally adapted to the peach. On light soils, the earlier will the tree bear and ripen its fruit, but the sooner will both fail.

## CHAPTER 2.

**SECTION 1. *Procuring Trees.***—Your committee would recommend purchasing of the nearest reliable nurseryman, and such as are grown at his nursery and he will guarantee to be true to name. This will place the planter in direct business relations with the grower, and he can hold him responsible for mistakes or any dishonesty.

**Sec. 2. *Time for Planting.***—Trees may be planted safely on sandy land during autumn. If trees have been grown on rich land, their growth will be somewhat soft, and when planted in the northern latitudes in the fall may suffer injury during the winter, while, if kept deeply "heeled in" over winter, they will suffer little or no injury. In either case it is best to secure the trees in autumn. Where trees are to be "heeled in," a well-drained location should be selected, and one free from grass, weeds, or rubbish, which form a covert for mice. Dig a trench sufficiently deep and broad to admit all the roots; place a single layer of trees at an angle of about 30 degrees with the general surface of the land; cover the roots with mellow earth, well mixed in and tramped, and up to the lower branches; then add another layer, overlapping the first, and so continue until all are trenched. Plant as early in the spring as the land can be prepared.

**Sec. 3. *Preparation of Ground.***—It should be thoroughly and deeply plowed and harrowed, until in best possible condition for planting.

**Sec. 4. *Distance.***—If the trees are to be grown under the "heading in" system, 16 feet apart each way is sufficient; but, if on the "full-growth" system, 18 feet is far the best for easy cultivation.

**Sec. 5. *Laying off the Land.***—With a bundle of laths and an 18-foot pole, set a row on each opposite side one way and one row in the middle, placing a lath at each 18-foot point; then, with a steady team, run a furrow on the line of the laths across the ground. Returning on the same line, run another furrow from the first, turning the ground in an opposite direction; then replace the laths for "sighters" when planting.

**Sec. 6. *Planting.***—First, prepare a mudhole near where the trees are "heeled in," of sufficient size to admit the roots. Only a few trees should be taken from the trench at a time, and all bruised and broken roots cut off and the tree carefully examined for borers; then plunge the roots into the mudhole, to give them a coating to protect from exposure to the air. Let one man hold the tree in the place indicated by the lath, another range it the opposite way by sighting from lath to lath across the ground; spread out the roots in a natural position, have another to throw onto the roots a few shovelfuls of well-pulverized surface soil, packing it well among and over the roots, and fill up till the earth around the tree is on a level with the general ground; when planted, the tree should lean slightly to the southwest. The varieties should be planted in succession; earliest ripening near the entrance of the orchard, and others according to their ripening season, progressively, to the rear. Three or four inches of mulching, in depth, and three feet in diameter, around the tree, will keep the land moist in seasons of drought, and prevent loss. When planted the branches should be trimmed close, and the main stem cut back to a uniform height of about three feet; this is essential to secure a good growth the first year, and in some cases the life of the tree depends upon it.

**Sec. 7. *After Treatment—Cropping.***—The orchard land between the rows may be planted with corn for the first two or three seasons, and thereafter plowed at least twice each year as long as the trees live. This should be done from the middle of April to the middle of May, and the middle of September and October. A small plow—10 or 12 inch—is the best for such work. In the spring plowing, furrows



should be turned from the trees; in the fall, towards them. A cultivator and harrow should be freely used during the fore part of the season.

SEC. 8. *Pruning*.—During the month of June, all straggling branches should be cut back, and all branches and suckers below the intended height of head removed. "*Cutting in*": Some growers practice this system annually. Downing and others equally noted commend it, while extensive peach culturists growing this fruit for market prefer to plant new orchards every few years. "Cutting in" is done by cutting back about one-half of the current year's growth in July or August, or early the following spring. By this process a large amount of new branches are formed near the main stem and near the ground, for fruiting the following season. It also invigorates and prolongs the life of a tree, and the fruit is larger and richer in quality. Further, it facilitates the capture of the curculio under the "jarring process."

## CHAPTER 3.

SECTION 1. *Necessary Tools—Ladders*.—The self-supporting ladder, 6 to 10 feet in height, is the most convenient form. It is made of two pieces of inch boards, six inches wide, for the sides, into which are grooved steps of same width, at easy stepping distances apart. On the top is a platform about 8 or 10 inches wide, on which a picking basket may rest, or the picker may stand when necessary. The top is secured by an iron rod.

SEC. 2. *Baskets*.—A convenient form for use in gathering the fruit is constructed of elm or basswood flats, 20 inches long, 12 inches wide, and 6 deep, holding one-half a bushel.

SEC. 3. *Crates*.—The standard one-third-bushel size in general use is 22½ inches long, 8 inches deep and 5 inches wide, and constructed of basswood for the ends and center and yellow poplar for sides and bottom. A neat, tasty box assists the sale of fruit, and it is to the interest of the grower to use the best.

SEC. 4. *Packing Platform*.—This is made 4x16 feet, with flooring or ship lap lumber, securely nailed to four or five supports or sills of 2x6-inch scantling, and when in use rests on the ground. It is easily moved to different portions of the orchard to suit the picking.

SEC. 5. *Picking*.—Plenty of ladders, baskets and crates should be provided in time for this work. The fruit must be mature but not ripe when picked, or it will shrivel, lack in proper color and flavor, and command a low price in the market. On the other hand, if overripe it will bruise and rot in shipping, and the profits will be materially lessened. The best test of maturity is in feeling of the fruit. If it yields under a gentle pressure of the hand, it is matured; if it does not, it is too green. If it indents, it is overripe, and will not do for shipping. The fruit is picked into baskets, in the bottoms of which has been placed a thin layer of tender young twigs, which will prevent bruising.

SEC. 6. *Packing*.—The packing is done directly from the baskets of the pickers. Extra boxes or baskets should be provided, into which may be cast overripe and damaged, inferior fruit. The crate is placed endwise to the packer. He places two large or three medium-sized peaches in the end next to him, holding them in place with his left hand; and he repeats this process until the crate is filled three-fourths of an inch above the tops of ends and center. The lid is nailed to the nearest end, and then pressed down to place and nailed securely. Two grades should always be made in picking; all overripes and culls should be carefully excluded. Mark each crate with name of variety and the grower, and send it to market to take its chances on its merits.

SEC. 7. *Culture after the Crop.*—After the crop is gathered, give the land a plowing and a liberal application of wood ashes and stable manure, to renew vitality, prolong the life of the tree, and produce successive crops of luscious fruit. A neglect of these requirements will result in failure and a loss of capital employed.

SEC. 8. *Varieties.*—It is not advisable for the ordinary grower to plant too many sorts. A list is here given of standard, well-tested varieties, from the earliest to the latest ripening. The commercial planter will select only those which in his judgment are adapted to his purpose. (See Voted Fruit List, in this volume.) \*

## THE PEAR.

This fruit is recognized and appreciated by the masses as one of the most luscious of all the classes brought under cultivation, and at the same time as of the most difficult and uncertain, in a large portion of the state. Such has been the uncertainty that few people have the needed confidence to plant more than a few trees, and, to use a common phrase, "to chance it." This lack of confidence too often leads to neglect, which, in many instances, becomes the prime cause of ultimate failure. That this fruit may be successfully grown in quite a large portion of Kansas, is beyond a doubt. Some localities are far better adapted to its culture than others, and the same may be truly said of all classes of fruit now being cultivated in the state.

### CHAPTER 1.

SECTION 1. *Site.*—It should be selected near by the dwellings—other requisites being present—for the convenience of giving proper care in culture, protection, and handling the fruit.

SEC. 2. *Elevation.*—The highest locations are the most desirable, as affording the facilities of drainage and necessary circulation of air, and an escape from disastrous spring frosts, as the tree is naturally an early bloomer.

SEC. 3. *Slope.*—Avoid a southern or western slope; all others are preferable, and an eastern the best.

SEC. 4. *Soil.*—This subject naturally divides itself into a selection between the two classes of trees known as "standards" and "dwarfs." We will consider the first class, viz., standards. These are trees grown by propagating the pear cion or bud on the pear root. They thrive best on a sandy or reddish shale land, having an open, porous subsoil to a great depth, for the reason that the pear roots naturally descend into the lower strata, and are most healthy in a well-drained surface and subsoil—conditions always present in soils of the above characterization. Under such conditions, the elaboration of food is natural; the deposits are made at the proper season, and mature into a character of ripeness capable of resisting attacks of disease, of enduring droughts and the extremes of heat and cold. With such trees there can be no questioning the character of the fruit product or longevity of the tree. The second class, viz., dwarfs, are trees produced by budding the pear onto the quince stock. The roots are of a fibrous character, and take kindly to a loamy soil with a clay subsoil, or even a general clay land; and as the larger portion of the soil formation in the state is of this character, the dwarf is the safer class to use.

SEC. 5. *Drainage.*—Ample drainage of both surface and subsoil is one of the indispensable requisites to a successful pear culture, and no orchard will thrive, or even live, for any length of time on land saturated with or which retains a surplus of water.

**Sec. 6. Shelters, or Wind-breaks.**—These are as important to a success with the pear as the apple orchard, and should be constructed of low-growing trees, on the south, west and north sides. A single row, with the trees six feet apart, is sufficient, excepting for exposed localities on open prairies, when there should be two rows six feet apart, and the trees in one row alternating with those of the other. As the pear is seldom planted in large numbers in Kansas, in the absence of other shelter it will be found convenient and advantageous to set them alternately in rows of an apple or peach orchard, running north and south. This method will secure both shelter and a partial shade from the noonday sun, which is to some extent the inducing agent to the development of "blight."

## CHAPTER 2.

**SECTION 1. Preparation of the Land before Planting.**—All land designed for pear trees, either standard or dwarf, should be well tilled and the subsoil well stirred. The system practiced in the most successful pear-growing regions of the United States is trenching. But the average planter would prefer to do without pears rather than to adopt such an expensive method. Therefore, as a substitute which in a measure will help to succeed, the land can be stirred 12 to 15 inches in depth by running the plow twice in the same furrow, turning the land first from and then twice to the line for the row of trees. This will raise the surface into a ridge on which to plant the trees, and both deep tillage and drainage will thus be secured.

**Sec. 2. Laying off the Land.**—The system generally employed for an apple or peach orchard is recommended for the pear.

**Sec. 3. Selecting Trees.**—One-year-old trees are preferable, though they cost the price of older ones. They should be stocky and vigorously grown, and well supplied with fibrous roots. The top should be cut back to within one foot of the collar, at the time of planting. This will secure the formation of low heads, which is of more importance with this fruit than any other. When the roots lack fibrous growth, which is quite common with standard trees, lateral roots should be encouraged by the "lipping process," which is performed with a sharp knife, by cutting through the bark into the wood, at intervals along the naked roots, upward. A callous will soon form at such points, and vigorous roots will push out.

**Sec. 4. Planting.**—The methods employed in planting an apple or peach are equally safe with a pear tree, with one exception, viz.: Pear trees should, under no circumstances, be set in the fall, as such seldom survive the ordeal of a Kansas winter.

**Sec. 5. Distance.**—Standards should be set 15 feet and dwarfs 10 feet apart each way. If both classes are used on the same piece of land, set the standards 20 feet apart in the row, and rows 15 feet apart, and alternate with dwarfs in the row. But after 25 years of successful culture in Kansas, it is recommended to use only the dwarf class of all varieties, excepting the Bartlett and Seckel, and adopt the process of converting them into what is known as the half-standard tree. This is done by setting the tree deep enough to bring the pear stock under the ground, from which pear roots will strike. In this way we obtain the early and abundant fruiting of the dwarf, and increase the longevity of the tree.

**Sec. 6. Cultivation.**—Pear trees should have the same care in culture as an apple tree; and as soon as they begin to fruit the land should be seeded to red clover. This should be cut each season and thrown around the trees for a mulch. Whenever they lack a proper vigor in growth, apply to each tree from one-half to a bushel of well-rotted stable manure every third or fourth year, in the fall or winter, or an annual dressing of the land around the tree of one-fourth a bushel of unleached wood

ashes. This treatment has not been recommended by the Society, but from the results of experience in some localities it is evident that more pear trees have failed from a stunt produced by starvation than from all other causes.

SEC. 7. *Pruning*.—Pear trees should have only such pruning as is needed to produce symmetrically-formed heads, and still sufficiently dense to shade the trunk and branches at all times. The "shortening-in" system should be applied the latter part of June each year, and the terminal growth of all central shoots "pinched off," for the purpose of checking and hardening the wood, and all interlocking and crowding growth removed from the center of the head.

### CHAPTER 3.—RELATING TO THE FRUIT.

SECTION 1. *Necessary Tools—Ladders*.—The common folding stepladder is the most useful form for gathering the fruit.

SEC. 2. *Baskets*.—The splint half-bushel basket, with an adjustable bail, is one of the best for picking.

SEC. 3. *Crates*.—The one-third-bushel size commonly used for shipping peaches is well suited for shipping the pear. They are cheap, and easily handled.

SEC. 4. *Time to Gather*.—To determine the best condition of the fruit for picking is quite difficult to explain. Such knowledge must largely come from experience. The size and color are no reliable index as a rule, as some sorts are always green-looking upon the tree, while others put on a beautiful red cheek long before ripe. The practice adopted with some growers is to gather as soon as the seeds are brown; with some varieties one-half of their richness will be lost by so doing. Other varieties require picking while they appear to be green, and even unripe, to secure their highest quality and to prevent a rotting at the core. The appearance at the proper time is peculiar to each sort, and cannot be described understandingly. It is safe, however, to gather the fruit whenever the stem will separate readily from the branch by turning it out of a natural position. It is then in best condition for gathering, and has attained its highest excellence.

SEC. 5. *Picking*.—The fruit should be gathered carefully, avoiding chafing or breaking of the skin, and placed (not dropped) in small baskets lined with paper. Care should be given to preserve the stems whole, especially of all such as are intended for market.

SEC. 6. *Sorting*.—The baskets containing the fruit are taken from the orchard to a sorting room, and there graded into first and second class and culls, according to size, appearance, and soundness, and, if intended for shipping, packed at once into crates, branded with grade and the name of grower, and sent to destination before the fruit has become the least mellowed. If for home market, shelves not over three feet wide and four inches deep, lined with soft paper, are preferable. In these place the fruit, not more than two layers deep, and cover with paper. Darken the room, and close it against any sudden changes in temperature. They should be examined every few days, and all such as begin to show a yellow color sorted out, packed in nine-pound grape baskets lined with merchants' tissue paper, covered with same, and sent to market. Such small packages, neatly put up, sell readily for family dessert purposes, at high prices. The culls can be disposed of for canning or preserves. As not all of the crop, even of the same variety, will become fit for picking at once, the trees must be run over several times before the entire crop is gathered. This is an advantage to the grower, as it will enable him to handle the crop without loss if carefully managed, as well as to take advantage of the market. Winter varieties should remain on the trees until in danger of frosts, then gathered, and all sound

fruit carefully packed in close, shallow boxes, lined with soft paper, and placed in a cool, darkened room, safe from freezing. They should be examined occasionally, and softening specimens carefully removed, but not otherwise disturbed until the time for marketing; then brought into a moderately warm room, care being taken to keep them closely guarded from exposure to light and air, or they will soon wilt, and never properly color or mellow.

SEC. 7. *Fruit Room*.—Such an apartment is an indispensable requisite in successfully handling a crop of pears, and such a convenience should be provided for every farm where fruit is grown even in quantity only for family use. It should be constructed with adjustable shelves and tables properly arranged for the various fruits of the season, and to avoid any taint from impure air or decaying fruit, and so that it may be darkened when not occupied. Absolute neatness should be maintained at all times, to preserve the delicious qualities and the delicate aroma peculiar to many sorts of fruit, which gives to them that delicate flavor so gratifying to the taste.

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#### CHAPTER 4.

SECTION 1. *Diseases*.—"Blight" is the most fatal disease to the tree—in fact, is the main hindrance to success, and the cause of failure. As to its cause, the opinions of the ablest men have differed, but recent investigations by most skillful observers, aided by powerful microscopes, have led to the belief that a species of parasitic plants—a low order of vegetable organism—is the direct agency. But what are the conditions congenial to its development and continued action is not fully established; nor have any reliable specific remedies or means of prevention been discovered.

SEC. 2. *Insects*.—The pear tree has no seriously injurious enemies among the insect tribe. A few of the defoliators, as the Fall Web Worm and Handmaid Moth, attack it. Its fruit, however, is subject to the depredations of the Codlin Moth, Apple Curculio, Plum Curculio, and Tree Cricket. The ravages of the last named are most seriously damaging, attacking and damaging the finest specimens to such an extent in some orchards as to reduce the marketable product materially.

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#### THE PLUM AND APRICOT.

These desirable fruits have not been extensively planted in the state, because of the damaging attacks of the curculio (worm) on the fruit, yet some facts have been gathered from observation and the experience of planters which encourage the hope that reasonable success may attend future efforts in their culture. Two classes have been used, viz., those of a foreign origin and their offspring, and those of native origin, which differ much in their characters.

The trees of the foreign class are not so hardy, productive or long lived as our natives, and while the fruit is vastly superior, their planting cannot be advised for extensive orchards.

There are some of the native class which are quite successful, and of which it is quite safe to plant. The trees are hardy, and produce crops of good fruit, which is less injured by the curculio.

## CHAPTER 1.

is a location which fowls frequent the most, as they destroying insects, and especially the curculio, which on the ground.

not an important point in the culture of the plum, most desirable soil, which is more generally found on

advantage is found in different slopes.

class requires a rich, moist soil, underlaid with a stiff shelly on our uplands. The native class thrives best, most largely found on bottom land, and such local crops.

drainage of the surface and subsoil is desirable, and uplands equal to that of the bottoms.

These fruits are generally planted near or among other trees and no wind-break. In open grounds it is as essential

## CHAPTER 2.

g.—Spring is undoubtedly the best time, and those at a considerable distance of a reliable nursery had better observe there is too much loss in most cases in "heeling in" the trees.

The plum tree does best where closely planted—12 is claimed by some, and evidently sustained by observation should be planted in nearness to each other, as the silencing element will be benefited by the stronger ones. *Pruning off of the Ground.*—This should be the same as for peach, pear, and cherry.

In all cases these fruits thrive best when worked on their own root, but may be used when worked on the peach root, but should not be from the graft. But it is safer to use them worked on

recommendations given for other orchard trees are safe in puddling the roots, which should never be kept wet with water.

It is generally to be recommended, using any old hay or

straw until the tree attains a bearing size, after which it may be done. Late fall and early spring culture might aid in

## GATHERING AND MARKETING THE FRUIT.

Before fully ripe, and, as they ripen unevenly, the trees are picked several times.

Small grape baskets; are more suitable than peach

has always been a home market for all grown in Kansas for peaches and cherries.

Notes.—(See Voted Fruit List, in this volume.)

## SMALL FRUITS.

### THE BLACKBERRY.

This delicious fruit is highly prized by the people in all sections of the state where grown, being about the last to ripen in the small-fruit season. It is a native of our forest lands, and its twin sister, the dewberry, thrives in some sections along the heads and skirts of ravines. A few varieties are successfully and profitably grown in nearly every county in Kansas, where it has been planted and given ordinary culture.

#### CHAPTER 1.

**SECTION 1. *Site.***—This fruit thrives quite well on any location not liable to be visited with late frost in springtime.

**SEC. 2. *Elevation.***—A comparative elevation is as important as with all other classes, and for the reasons heretofore given.

**SEC. 3. *Slope.***—Avoid a southwestern slope or exposure. Any other is preferred.

**SEC. 4. *Soil.***—A light, warm soil, having a porous clay subsoil (red or yellow preferred), is best suited to its culture.

**SEC. 5. *Drainage,*** either natural or artificial, is essential to success.

**SEC. 6. *Wind-breaks.***—These are valuable, when constructed on the south and southwest, as a protection during the growing and fruiting season.

#### CHAPTER 2.

**SECTION 1. *Time for Planting.***—The best results have followed planting in the spring.

**SEC. 2. *Distance Apart.***—Most experienced growers prefer the rows to be eight feet apart, and plants two and a half feet in the row, for the large-growing varieties. For those of a dwarf habit, the rows may be only six feet apart.

**SEC. 3. *Preparing and Laying off the Ground.***—Plow as deeply as practicable, and, if the subsoil is not naturally porous, follow with a subsoil plow, late in the fall, and the following spring harrow it well and level down with a platform drag. Stake off places for the rows, and along these open deep furrows with a two-horse plow, if strong, rooted plants are to be used; but if root cuttings, then with a one-horse plow.

**SEC. 4. *Selecting Plants.***—Strong-grown and well-rooted suckers are the best. These may be dug in the fall and "heeled in" during the winter, or taken from an old plantation in early spring and set out at once. In either practice, care should be given to protect their roots from drying winds and the sun. Root cuttings should be made in the fall, using none less than a quarter of an inch in diameter, and from four to six inches in length, and packed in moist soil or sand, and stored in a cool, damp cellar. In early spring, set them in the permanent plantation, or in nursery rows. Cultivate one season, and the following spring transplant into rows, the same as recommended for rooted plants.

**SEC. 5. *Planting.***—The rules given for setting red raspberry plants may be safely followed with this class. (See ch. 4, sec. 5.) Dewberry plants, the same as blackcap raspberry. (See ch. 2, sec. 5.)

**SEC. 6. *Cultivation.***—This work may be given similar to the recommendations

for raspberry plantations. During the first year, garden vegetables may be grown between the rows, or even a plantation of strawberries may be profitably grown, without injury to the plants.

SEC. 7. *Pruning*.—It is not best to summer trim the plants the first season after planted, but shorten in their tips the following spring, and each year thereafter. As soon as the new canes reach a height of  $1\frac{1}{2}$  or 2 feet, pinch off the ends, which will encourage lateral growth, and strengthen the main stems. Each spring the laterals should be shortened to within a foot of the stem. There is an advantage in not removing the old and dead canes until winter is past, as they will collect the snows and afford shelter to stalks and roots during cold weather. Only four to six canes should be allowed to form from any one plant in any season.

SEC. 8. *Gathering and Marketing the Fruit*.—About the same methods recommended for the strawberry should be adopted in the handling of this fruit. (See ch. 2, secs. 1-7.) Like all soft fruits, it should never be handled when wet, or after picked be exposed to the sun or winds.

SEC. 9. *Recommended List of Varieties*.—(See Voted Fruit List, in this volume.) For the southern tier of counties, the Kittatinny and Lawton generally succeed, but have proven too tender generally in the northern and central districts; while the Snyder and Taylor have not been injured seriously by either in any large portion of the state.

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## THE CURRANT.

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This healthful fruit has been annually increasing in successful culture, until at the present time its culture can be safely undertaken in a large portion of the state. From the time at which the plant enters its dormant state (which is generally by the middle of August), until it commences its growth the following spring, is the period of its trials, owing to the debilitating effect of extremely hot and dry weather commonly occurring during the after part of the summer, and which is followed by the extreme cold of winter.

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### CHAPTER 1.

SECTION 1. *Location*.—The borders and corners of a garden, or any place which will afford shade and shelter from the midday sun and hot winds, is preferred, and will furnish the best results, but in some portions of the state it has become successful even in open-field culture.

SEC. 2. *Elevation and Slope*.—Neither of these requires attention in its culture.

SEC. 3. *Soil*.—A clay loam that retains moisture and coolness is preferred. Light, sandy or friable soils are not desirable.

SEC. 4. *Drainage*.—Such as will prevent a stagnant condition during heavy rain-falls is essential.

SEC. 5. *Wind-breaks*.—Shelters which will protect the plants from hot south winds should be constructed. These may be made of low-growing trees, or even a common board fence or stone wall on the south will form all needed shelter for several rows which run east and west.

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### CHAPTER 2.

SECTION 1. *Time for Planting*.—It can be safely done in autumn, and the sooner after the leaves have dropped the better. If deferred until spring, it should be done as soon as the frost leaves the ground and a proper preparation can be secured.



Sec. 2. *Preparation of the Land.*—It should be deeply stirred and thoroughly pulverized, and made rich with well-rotted manure.

Sec. 3. *Selecting Plants.*—Strong, healthy and well-rooted one-year-old plants are preferable.

Sec. 4. *Distance to Plant.*—Set in rows five feet apart and three feet in the row.

Sec. 5. *Planting.*—Before setting, the long, straggling roots should be shortened in, and bruised portions cut off, and remaining ones dipped into a thin mud. The top should be reduced by cutting back all of the last year's growth to within four or five inches of the crown. Set in holes or in a furrow, sufficiently deep and large to admit of the roots spread out in a natural position. Fill in with surface soil, working it well in among the roots with the hand, then close up around the plant so that when the earth is firmly settled the roots will be well covered. As with plants of all classes, their roots should be kept moist and protected from the time they are taken from the ground until reset.

Sec. 6. *Cultivation.*—The land should be kept in good tilth at all times during the growing season, and especially during the latter part of summer, unless mulching is used, which performs a good service in keeping the ground cool and moist through the heated season. These conditions secure a strong, healthy fruit bud for the next year's crop, to which its abundance, full clusters, and excellent character are largely indebted.

### CHAPTER 3.—HANDLING AND MARKETING THE FRUIT.

SECTION 1. *Picking.*—The recommendations given for the strawberry are to be observed in reference to this fruit. It must be picked by the stem, and not stripped off, and all defective and unripe berries removed from the clusters. When the box is being filled, a few gentle raps should be given to settle the clusters into place. All the conveniences and same character of boxes and crates used in the handling of other small fruits are equally adapted to this.

## THE GOOSEBERRY.

The past few years have demonstrated the gooseberry to be among the valuable small fruits. Its easy cultivation and propagation, usefulness, and hardiness of the plant, together with its early bearing and good shipping qualities, make it especially desirable to every Kansas home and among market gardeners. This fruit, unlike most others, is valuable as soon as the berries are well formed. It is ready for the table in pies, tarts and puddings earlier than any other fruit. There are, however, but few varieties that can be recommended as possessing high excellence.

### CHAPTER 1.

SECTION 1. *Propagation.*—Gooseberry plants should be grown only from cuttings. In preparing cuttings, select only the straight, young canes of the current year's growth. These should be 10 or 12 inches in length, and should be made during the winter, when the wood is not frozen.

Sec. 2. *Location.*—Almost any location is suitable for this fruit. While shade seems beneficial in many locations, the best results are obtained from open grounds.

Sec. 3. *Soils.*—A clay loam is preferred, for the reason that it retains moisture best. Avoid, however, wet, soggy, land; such can be used if well drained.

**Sec. 4. Preparation of the Land.**—Such as is required to yield good field crops will be suitable for this fruit.

**Sec. 5. Time for Planting.**—As the plant starts very early in the spring, it is advisable to plant in the fall, or as soon in the spring as the frost leaves the ground.

**Sec. 6. Distance Apart.**—As this fruit requires thorough cultivation, it should be set in rows five feet apart and four feet in the row.

**Sec. 7. Planting.**—The recommendations given for planting the currant or blackberry apply equally to the gooseberry.

**Sec. 8. Cultivation.**—The recommendations given for other small fruits in this manual apply equally to this fruit.

**Sec. 9. Handling and Marketing.**—Owing to the exceeding firmness of this fruit, its handling and marketing are more easily conducted than any other of the small fruits. It can be gathered at times when other classes cannot, viz., in the early morning, when yet covered with dew, or immediately after showers, as it readily dries out, and can be marketed the next or several days thereafter without injury or loss. Care should be given at all times to exclude all leaves and damaged berries in its picking. It can be shipped a longer distance than any other of the small fruits. It can be shipped in packages similar to other small fruits, or in bulk in baskets.

**Sec. 10. Recommended List.**—(See Voted Fruit List, in this volume.)

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## THE RASPBERRY.

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This class appears to stand second to the strawberry in the list of small fruits, in a succession, the season of the early varieties beginning just when that of the strawberry ends. It also appears to be rated second in commercial importance. But considering its superiority for canning and evaporating, which makes it a standard article in this condition in our markets, there may be some doubts as to its being second to any of the berries known to horticulture.

The classes—blackcap and red—differing in many features, and requiring different treatment in their culture, will be considered separately.

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## THE BLACKCAP.—CHAPTER 1.

**SECTION 1. Selecting a Site.**—Never select a comparatively low piece of land for the raspberry, or where there will be a stagnation of air.

**Sec. 2. Elevation.**—The high lands of Kansas prairies are well adapted to raspberry culture, and are preferable to low bottom lands.

**Sec. 3. Slopes.**—Lands sloping to the north or northeast afford the most satisfactory results. Plants on southern slopes are liable to injury from the winter suns.

**Sec. 4. Soil.**—Naturally, the plant thrives best in a deep, warm soil. Cleared brush or timber lands, abounding with leaf mold, and having a red clay porous subsoil, are preferred; but quite successful results can be obtained on much of the rolling prairies in the state having a porous subsoil.

**Sec. 5. Drainage,** either natural or artificial, is essential. The plants will not thrive in places where water remains any length of time about their roots.

**Sec. 6. Wind-breaks.**—Shelters on the north and south sides are valuable. Orchards often afford the necessary protection, and, while young, the spaces between rows may be profitably planted to raspberry plants. The culture required is not only beneficial to the plants, but also to the orchard trees. In such locations the yield is far greater than in an open, exposed field.

## CHAPTER 2.

SECTION 1. *Time for Planting.*—Springtime is generally conceded to be preferable; but such work may be done quite successfully in late autumn, if the directions following are strictly adhered to.

SEC. 2. *Preparing and Laying off the Ground.*—The land should receive a deep plowing in the fall, and be thoroughly harrowed in early spring, as soon as frost leaves and the land becomes sufficiently dry to work. When this has been done, establish a line of stakes as guides for the row, and with a team and plow open up a deep furrow along the line.

SEC. 3. *Distance Apart.*—The rows should be seven feet, and plants in the rows 2½ feet apart.

SEC. 4. *Selecting Plants.*—Good plants should have a large supply of fibrous roots. These should be of a light color, nearly white, to be in a healthy state. If dark brown, they have been injured, and plants having such roots should be rejected. The same advice heretofore given should be strictly heeded in buying raspberry plants, viz.: Obtain them from a reliable grower, as near by as practicable. But if necessary to ship them from abroad, as soon as received take them from the box, dampen their roots, and "heel in" until planting time.

SEC. 5. *Planting.*—Having the plant roots well moistened, and straggling ones shortened in, place as many in a basket as can be conveniently carried in one hand, and drop one plant in the furrow a short step apart. Have another man follow the dropper and cover them with a hoe until the furrow is nearly filled up with loose, moist earth, being careful not to pack it down over the plant, so that the tender shoot will not be hindered in easily pushing through to the surface.

SEC. 6. *Cultivation.*—This should be simply clean culture till about the first of August, and no later, or a late growth will be induced, which is not desirable. Between the rows may be grown crops of early potatoes, peas, or beans. In all cultivation, work the earth up to the rows, to give depth of soil around the plants. Each year after the first, cultivation should begin in the spring and be kept up until picking time, and, as soon as the fruit is gathered, be continued as advised for the first year.

SEC. 7. *Pruning.*—A heavy pair of buckskin gloves and a pair of pruning shears are the only implements needed after the first year. During the spring of the second year, the previous year's growth should be cut back—the central growth to about 18 inches high, and the laterals to within six inches of the stock. When the new canes have grown 18 inches in height pinch off the end to cause it to throw out laterals.

SEC. 8. *Mulching*, as a protection, is injurious, as it has the tendency to induce the roots to form too near the surface of the ground. It should only be applied as a fertilizer, and then in a rotted state, and worked into the ground while cultivating.

SEC. 9. *Gathering and Marketing.*—The recommendations given under the head of "Strawberry Culture," chapter 3, sections 1-7, are to be regarded as applicable to raspberry culture, and need no repetition under this head.

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RED VARIETIES.—CHAPTER 3.

SECTION 1. *Sites.*—High prairie and timbered hills have so far produced the best results.

SEC. 2. *Soils.*—Light, porous, sandy and well-drained soils are preferable.

SEC. 3. *Drainage.*—The recommendations for the blackcap class are applicable

to this class. (See ch. 1, sec. 5.) Quite heavy soil can be made suitable for this class by giving it a proper drainage.

SEC. 4. *Wind-breaks.*—This class is not so much benefited by such protection as other fruits. Their natural habit of growth enables them to better resist the force of winds; yet there are some varieties that require their help, and, as a whole, their culture is aided by them.

#### CHAPTER 4.

SECTION 1. *Time for Planting.*—If the land selected for this class is inclined to heave by freezing, the spring is decidedly preferable. On other lands planting may be successfully done in autumn.

SEC. 2. *Preparing and Laying off the Ground.*—For this class follow the directions given for blackcaps. (See ch. 2, sec. 2.)

SEC. 3. *Distance Apart.*—The rows should be from six to seven feet apart, and plants about three feet apart in the rows. Some varieties may require greater distances, which the planter should judge and regulate accordingly.

SEC. 4. *Selecting Plants.*—It is very important that they be healthy and vigorous, not that they must be large plants. Suckers not over 18 inches high, if stocky grown, will make large and well-developed plants when transplanted.

SEC. 5. *Planting.*—When the land is in good working condition, take the plants from the "heeling-in" trenches, or from a plantation, dip their roots in a thin mud, and set in furrows as recommended for blackcaps (see ch. 2, sec. 2,) in the following manner, viz.: One man with a bundle of plants places one in an upright position in the furrow every two or three feet apart, holding it in place while with his foot he draws around it sufficient earth to cover the roots, and then firmly tramps it down. This will hold it in position until another man following fills up around the plant until the furrow is full. As soon as the planting is completed, with a plow turn the ground to the row, completely filling the furrow opened for the plants.

SEC. 6. *Cultivation.*—As much of the success depends on the first year's growth, it should be cultivated thoroughly from early spring until the 1st of August, unless the land continues weedy, when it may be fallowed later, but quite shallow, and largely with a hoe.

SEC. 7. *Pruning.*—This, with the red class, should be done only in the spring, and about the time buds begin to start, by cutting back the canes to within two feet of the ground, and removing all damaged and dead wood.

SEC. 8. *Second Year's Culture.*—Cultivation should commence early, and cease when the fruit begins to ripen. In the management of the plantation, the hill system has proven the most satisfactory. This consists in keeping all sucker growth cut down, and permitting about four or five strong canes to form about the parent plant.

#### CHAPTER 5.

SECTION 1. *Picking and Marketing.*—The same rules given for strawberry culture will be applicable to the red class. (See ch. 3, sec. 1-7.)

SEC. 2. *Recommended List of Varieties.*—(See Voted Fruit List, in this volume.)

### THE STRAWBERRY.

This class of fruit is a success over a large portion of the state. Its easy culture, productive habits, and the delicious character of its fruit, have combined to make it desirable and popular wherever grown.

## CHAPTER 1.

**SECTION 1. *Selecting a Site.***—If the plantation is intended only for family use, select a place near the dwelling, and where it can be protected from the depredations of poultry. But for commercial purposes it should be beyond their range, and, when practicable, within plain view of the dwelling, that it may be guarded from the intrusion of depredators.

**Sec. 2. *Elevation.***—The most successful is land having a comparative elevation; that is, elevated above the general surrounding land. This may be found even on a general bottom land, and is desirable because of its greater liability to exemption from late spring frosts, and the better air circulation existing at such locations.

**Sec. 3. *Slope.***—For an early-ripening product of fruit, a southern slope is best, but a northern slope is safest for the main crop, as the plants are retarded in the development of the fruit buds, and will generally escape the damage of a late frost.

**Sec. 4. *Soil.***—Brush or timber land, when cleared and properly prepared, will afford the best results; yet a deep, clayey loam will produce a vigorous plant and abundant crops, and is preferred whenever the first named is not obtainable. Avoid alkaline land, and also thin, upland, sandy land, unless where underlaid with a tenacious subsoil.

**Sec. 5. *Drainage.***—Strawberry plantations must have sufficient either natural or artificial drainage to prevent saturation or a stagnant condition of the rainfalls.

**Sec. 6. *Wind-breaks*** are essential to prevent too rapid evaporation of moisture in March and April, from newly-set plantations, and the blowing off the winter mulching from the old ones.

## CHAPTER 2.

**SECTION 1. *Time for Planting.***—Experience has settled upon spring as the best time, and as early as the land can be suitably prepared. Planting may be done the last of August and fore part of September, when circumstances unavoidably have prevented it in early spring, but never with the best results.

**Sec. 2. *Distance Apart.***—This is governed somewhat by the character of the varieties used. But for a mixed lot and field culture,  $3\frac{1}{2}$  to 4 feet is best for the rows, and from 1 to  $1\frac{1}{2}$  feet in the row. In garden culture, plant two rows 15 inches apart, and the plants one foot in the row. Then leave a space  $2\frac{1}{2}$  feet in width, and plant two more rows in same form as the first; and continue in this form until the land is filled out.

**Sec. 3. *Preparing the Ground.***—Thoroughly and deeply plow the land, in autumn, if practicable. If not, then as early in spring as condition will permit, and harrow until well pulverized.

**Sec. 4. *Laying off the Ground.***—There are two modes for doing this. First, attach two buggy wheels to an axle having the desired length to give the distance determined upon for the rows apart. Stake off the first row, and pull or push the wheels over the land, following the line of stakes. The wheel tracks will be the line to plant. Then measure from the inside wheel track  $1\frac{1}{2}$  the length of the axle onto the unmarked land, and there set stakes for guides to another crossing with the wheels, which will make marks for two more rows of plants. Follow in this way over all the land to be planted. Second, in the absence of wheels, use a strip of common fence plank of the length of 7 feet, if the rows are to be  $3\frac{1}{2}$  feet apart, and 8 feet, if to be 4 feet apart. On its ends and at the middle fasten pieces of boards for markers; attach a tongue, and proceed in same manner as directed with the wheels.

**Sec. 5. *Selecting Plants.***—Strong, vigorous one-year-old plants should always be used (older ones are not worth planting), and obtained of the nearest reliable grower. Their roots should be packed in some dampened material as fast as taken from the ground, and kept so until either “heeled in” or planted in the row. Plants shipped in are never as good as home-grown ones.

**Sec. 6. *Planting.***—A man with a spade, beginning at the end of a mark where the row is to be planted, places the middle of the spade on the mark and crossways of the row, thrusts it into the ground at an easy angle to a sufficient depth to receive the roots of the plant in a natural position, shoves the handle forward to an upright position, and at the same time another man grasping a plant well down onto the crown with the thumb and forefinger, places the same into the opening and under the spade sufficiently deep to have its crown a little under the ground when let back by lifting out the spade, and gently pressed down with the foot as the spader passes to the next place for a plant. Two men should in this way plant from 2,500 to 3,000 plants in a day. Care should be taken not to form too great a depression around plants, as heavy rains will wash in the dirt, covering the crown so deep that it will rot before the start gets above ground, unless the weather is quite warm.

**Sec. 7. *Cultivation.***—This work should be commenced shortly after the planting is finished, and continued constantly through the season until autumn frost occurs. At first run a cultivator between the rows, gauged so as to turn the ground to the plants, avoiding covering them, and the forming a trench which would retain rain-falls around the plants. Then follow with hoe to level down any ridges which may occur, and clear out all weeds. In some kinds of heavy clay soils it sometimes becomes necessary to run a one-horse turning plow with the bar side well up to the row, and in a few days work the dirt back to the row with a cultivator. As a strong plant growth is the one important end to be gained, it is folly to permit the newly-set plants to develop blossoms and fruit the first year; therefore all such growths should be promptly pinched off as soon as they appear. All runners should be promptly removed until the plant becomes well established; then, if to be grown under the matted-row system, the runners should be turned into the space between the hills, and then into the space between the rows. During the after season, in cultivating, fasten to the front of the cultivator a crossbar, on each end of which is attached a rolling coulter, gauged at such distance apart as will give the desired space for culture between the matted rows. This implement will remove all plants from the space. Matted rows have generally the preference to any other system of growing the strawberry, the main reason being that the prevalence of root-destroying insects will not be so disastrous as in the single-hill system.

**Sec. 8. *Winter Protection.***—Every plantation should have a protection during the winter months, and in a bearing season until the crop of fruit is gathered. Old prairie hay is the best, being freer from weed seeds and other foul matter than most any other substance. This should be placed on the rows in autumn or early winter, as the ground becomes frozen, to prevent injury occurring from heaving of the land by freezing, and the exposure of the roots to sun and wind; also during the fruiting season, to retain moisture.

### CHAPTER 3.—GATHERING AND MARKETING THE FRUIT.

[NOTE.—On the methods adopted for the picking and disposing of the crop largely depends the success or failure of the profits of a plantation.]

**SECTION 1. *Picking Stands.***—These should be provided beforehand, and made a suitable size to hold six quart boxes, by using four corner posts 4 to 6 inches long and 1 to 1½ inches square. The sides, ends and bottom should be covered with common lath, cut into proper length, put on with fine shingle or common lath nails,

leaving spaces between each of one to two inches wide, to the ends of which attach a bail or handle of some tough wood.

SEC. 2. *Boxes*.—For large plantations, the material should be secured in autumn and made up during the winter. There are two styles, the "Leslie Oblong Octagon" and the "Halleck," which is square. Either should be yellow poplar wood. The first is the more generally used.

SEC. 3. *Crates*.—The material for these should be procured early in the season, and made up. The size holding 24 boxes is most suitable for all purposes, and should be of yellow poplar wood.

SEC. 4. *Packing House*.—Every plantation of half an acre or more should be provided with ample shelter and storage room for the fruit during the picking season. If simply for shelter from sun and winds, it may be constructed of common canvas cloth, stretched on a pole frame; but if for shelter from rains, then it should be constructed of lumber. In either structure, shelves should be provided within, on which to place the boxes when brought from the plantation before packed.

SEC. 5. *Picking*.—For shipping, the fruit should be gathered as soon as fairly colored. For home market, where it will be used in a short time, it should be allowed to remain until fully ripened, to attain its highest excellence. For either purpose, care must be given to pick by the stem, a short portion of which should be left attached to the fruit. It is best not to touch the fruit in picking, as any loosening of the stem, or pressure causing the juices to flow, will prove an injury, and often spoil a large portion of the box. None but sound and well-formed berries of standard size should be placed in the boxes, either for a first or second class—the grading being made as to size only. Plantations should be carefully picked over each day, to prevent any fruit becoming overripe.

SEC. 6. *Packing*.—Each box should be slightly overfull, and their tops faced by turning the stem end of the berry down, to give an attractive appearance to the whole, and placed in close-fitting crates, closed up, marked with name of variety and grower, and put on its route to its destination at once.

SEC. 7. *Marketing*.—All soft classes of fruit should be hauled to market in spring wagons, and even then care should be given, in driving over rough roads, to avoid all shaking and jostling as much as possible. Gentle driving will pay.

#### CHAPTER 4.

SECTION 1. *Recommended Varieties*.—(See Voted Fruit List, in this volume.) For a home or near market, preferred in the order named: Crescent, Windsor Chief, Miner's Prolific, Glendale.

SEC. 2. *Renewing or Continuing a Plantation*.—Some very successful growers adopt the plan of plowing under all plants after they have yielded a crop of fruit, holding that a second year's crop is not profitable; and, further, that should there be a prevalence of insects noxious to the leaves and roots, as the Leaf Roller, White Grub, and Crown Borer, such treatment will cause their extermination. Others continue their plantations through two or more years. This method requires breaking up the land, and leaving about one-foot strips of plants, which answer for rows, at proper distances apart throughout the plantation, and cultivating the spaces between as in a new plantation.

## SELECT FRUIT LIST FOR KANSAS.\*

BEING THE RECOMMENDATIONS OF THE COMMITTEES PREPARING THE MANUAL.

The following list is calculated for a family orchard, and the varieties are arranged in the order of preference:

## APPLES.

*Summer*.—Early Harvest, Carolina June, Sops of Wine, Cooper's Early (White), Early Pennock.

*Autumn*.—Maiden's Blush, Chenango, Lowell, Jonathan, Wine (Pennsylvania Red-streak).

*Winter*.—Winesap, Ben Davis, Missouri Pippin, Jonathan, Broadwell (Sweet), Rawle's Genet, Rome Beauty, White Winter Pearmain, Smith's Cider, Grimes's Golden.

*Crab Apples*.—Transcendent, Hyslop, Whitney's No. 20.

## APRICOTS.

Moorpark, Breda, Early Golden, Russian.

## CHERRIES.

*Early*.—Early Richmond, May Duke, Governor Wood, Leib, Montmorency.

*Late*.—English Morello, Common Morello, Belle Magnifique, Ostheim, Late Richmond.

## PEACHES.

*Early*.—Amsden, Alexander, Hale, Rivers, Louise, Large Early York, Crawford's Early, Wyandotte Chief, Troth's Early.

*Medium*.—Stump the World, Old Mixon Free, Old Mixon Cling, George IV, Smock, Morris White.

*Late*.—Heath Cling, Crawford's Late, Salway, Ward's Late, Stump the World.

## PEARS.

**NORTHERN DISTRICT.**—*Early*: Summer Doyenne (Doyenne d'Été), Osband's Summer, Bartlett, Clapp's Favorite, Flemish Beauty. *Medium*: Bartlett, Howell, Sheldon, Seckel, Angouleme (Duchesse). *Late*: Seckel, Angouleme, Lawrence, Winter Nelis, Vicar.

**CENTRAL DISTRICT.**—*Early*: Early Harvest, Summer Doyenne, Rosteizer, Osband's Summer, Clapp's Favorite. *Medium*: Bartlett, Flemish Beauty, Howell, Louise Bonne de Jersey, Kieffer. *Late*: Seckel, Lawrence, Easter Beurre, Winter Nelis, Vicar.

**SOUTHERN DISTRICT.**—*Early*: Early Harvest, Summer Doyenne, Madeleine, Osband's Summer, Seedless. *Medium*: Bartlett, Clapp's Favorite, Flemish Beauty, Howell, Louise Bonne de Jersey. *Late*: Sheldon, Angouleme, Lawrence, Winter Nelis, Vicar.

## PLUMS.

Wild Goose, Miner, Weaver.

*For Trial*.—Mariana, Bassett, Yellow Chickasaw.

\* NOTE.—The Voted Fruit List, as prepared by the Society, will be found at the close of this volume.



## GRAPES.

*Early*.—Hartford, Moore's Early, Champion, Early Victor.

*Medium*.—Concord, Delaware, Pocklington, Martha.

*Late*.—Catawba, Goethe, Dracut Amber, Ives, Clinton.

## BLACKBERRIES.

*Early*.—Kittatinny, Early Harvest, Taylor, Early Cluster.

*Late*.—Snyder, Lawton, Kittatinny, Stone's Hardy.

## CURREANTS.

Red Dutch, Cherry, White Grape, White Dutch.

## RASPBERRIES—BLACKCAPS.

*Early*.—Souhegan, Hopkins, Tyler, Davison's.

*Medium*.—McCormick, Smith, Ohio.

*Late*.—Gregg.

## RED VARIETIES.

Shaffer, Cuthbert, Reliance, Turner, Thwack.

## GOOSEBERRIES.

Houghton, Downing, Smith, Pale Red.

## STRAWBERRIES.

*For a Home or Near Market*.—Crescent, Windsor Chief, Miner, Glendale.

## SYNONYMS.

For the advantage of planters in making a selection, the following are the synonyms, so far as published, to the varieties in the recommended "Fruit List:"

## APPLES—SUMMER VARIETIES.

*Early Harvest*.—Synonyms: Prince's Harvest, July Pippin, Early July Pippin, Yellow Harvest, Large White June Eating, Tart Bough, Early French Reinette, Sinclair's Yellow, Maralandica, Oats Apple (by Downing).

*Carolina June*.—Carolina Red June, Carolina Russet, Carolina Striped June, Caroline, Caroline Watson, Carpenter's No 1 (by Warder), Carolina Red June, Carolina Redstreak, Carolina Red Stripe, Carolina Spice, Carolina Striped June, Knight's Red June, Red June, Blush June, Georgia June, Wilson's June, Red Harvest, Susy Clark (by Downing).

*Red Astrachan*.—Deterding's Early, Astrachan Rouge, Vermilion d'Été, Abe Lincoln (by Downing), Red Bellflower (by Warder).

*Cooper's White*.—Early White Cooper (by Downing).

*Oldenburg*.—Smith's Beauty of Newark, New Brunswick (by Downing), Duckett (by Warder).

*Hightop Sweet*.—Hiker's, Hill's Favorite, Hilton, Hinesley, Hoary Morning, Hookett Sweet (by Warder), Summer Sweet, Sweet June, Early Sweet (by Downing).

## AUTUMN VARIETIES.

*Maiden's Blush*.—Vestal (by Downing), Maiden's Favorite, Major, Malamuskeet, Male Carle, Mammoth June, Mammoth Pippin (by Warder).

*Rambo*.—Rambour Franc (by Warder), Fall Romanite, Gray Romanite, Striped Rambo, Delaware, Romanite, Seek-no-further, Bread and Cheese Apple, Trumpington, Large Rambo, Terry's Redstreak (by Downing).

*Lowell*.—Pound Royal, Queen Anne, Orange, Michigan Golden, Tallow Apple, Greasy Pippin, Golden Pippin (by Downing), Lucombe's Seedling.

*Jonathan*.—Julien, July (by Warder), Jones Pippin, Journalaskia, King Philip, Philip Rick (by Downing).

*Fameuse*.—Pomme de Neige, Sanguineus, Snow Chimney, Snow (by Downing), Chimney (by Warder).

*Grimes's Golden*.—Grosh, Grosser Erdbeere, Gullett, Gully (by Warder), Grimes's Golden Pippin (by Downing).

*Fall Wine*.—Sweet Wine, Ohio Wine, Sharpe's Spice, Uncle Sam's Best, Musk Spice, Hower or House (by Downing), Fall Winesap (by Warder).

## WINTER VARIETIES.

*Winesap*.—Winfield (by Warder), Winesop, Potpie Apple, Uxbridge Spice, Holland's Red Winter, Royal Red of Kentucky (by Downing).

*Ben Davis*.—Robinson's Streak, Hutchinson's Pippin, Joe Allen, Kentucky Red Streak, Tenan Red, New York Pippin, Victoria Pippin, Victoria Red, Red Pippin, Kentucky Pippin, Baltimore Red, Baltimore Pippin, Baltimore Redstreak, Carolina Redstreak, Funkhouser (by Downing), Ben Harris (by Warder).

*Missouri Pippin*.—Missouri Keeper (by Warder).

*Rawle's Genet*.—Jefferson Pippin, Missouri Janet, Red Neverfail, Rawle's Jannet, Rawle's Jannetting, Rawle's Janet, Rock Remain, Rock Rimmon, Yellow Janett, Winter Jannetting, Jeniton, Jennett, Neverfail, Indiana Jannetting, Rawle's Genetting (by Downing).

*Willow Twig*.—Willow, James River (by Warder).

*Smith's Cider*.—Smith's, Faller, Pennsylvania Cider, Fowler, Poplar Bluff.

*Rome Beauty*.—Gillett's Seedling (by Warder).

*Gilpin*.—Carthouse, Roman Knight, Small Romanite, Romanite of the West, Gray Romanite, Little Romanite (by Downing), Little Red Romanite (by Warder).

*Dominie*.—English Rambo, Hogan, English Redstreak, Wells, Striped Rhode Island Greening, English Beauty of Pennsylvania, Cheat, Clingtight, American Nonpareil (by Downing).

*White Winter Pearmain*.—Campbellite (by Downing).

## ADDITIONAL LIST OF POPULAR VARIETIES.

*Wine*.—Hay's Winter, Pennsylvania Redstreak (by Warder), Winter Wine, English Redstreak (by Downing).

*Porter*.—Jennings, Smokehouse, Millcreek Vandevere, Red Vandevere, English Vandevere (by Downing).

*Fallwater*.—Mountain Green, Benjamite, Falwalder, Fornwalder, Tulpehocken, Prim's Beauty of the West, Pound, Mountain Pippin, Winter Blush, Green Mountain Pippin, Mollywhopper, Falder, Fallawalder (by Downing).

*Ortley*.—White Bellflower, Ortley Pippin, Woodman's Song, Greasy Pippin, Melt-ing Pippin, Yellow Pippin, Woodward's Pippin, Davis White Pippin, White Detroit, Hollow-cored Pippin, Jersey Greening, Crane's Pippin, Marrow Pippin, Ohio Favorite, Willow Leaf Pippin, Detroit, Warren Pippin, Golden Pippin.

*Fall Pippin*.—York Pippin, Pound Pippin, Golden Pippin, Cathead Pippin, Philadelphia Pippin (by Downing).

*Red Winter Pearmain*.—Hornsby's Red, Kirby's Red, Red Gilliflower, Red Lady Finger, Bunkum, Jackson's Red, Buncombe, Red Vandevere, Batchelor, Southern Fall Pippin, Red Fall Pippin, Meigs, Powers (by Downing).

*Pennock*.—Large Romanite, Romanite, Big Romanite, Pennock's Red Winter, Prolific Beauty, Gay's Romanite.

# DEPARTMENT OF FUNGI.

## FUNGOUS DISEASES OF PLANTS AND THEIR TREATMENT.

### COMPILATIONS AND OBSERVATIONS BY THE SECRETARY.

*Fungi: Their Origin and Development*, by PROF. J. E. HUMPHREY, before the Massachusetts Horticultural Society: What do we mean by fungous diseases of plants? It is a mere evasion to say we mean diseases caused by fungi. One form of expression is as good as the other, and the essential need of the inquirer concerning fungous diseases is a clear notion of what fungi are. Now, fortunately, this is not an impossible thing to acquire, although, unfortunately, such notions are to-day rarely possessed, even by well-informed, cultivated men and women who take pride in keeping abreast with the world's progress.

It is just this lack of definite ideas which is hampering and discouraging to the economic mycologist. Its replacement by an understanding of a few simple principles of fungus life would be a most wonderful gain, both for those who can impart and for those who desire to receive practical information concerning the various fungous diseases which contribute so largely to the exemption of our farmers and gardeners from—what most of them would gladly risk—the curse of the rich man.

The cloud of mystery which appears to befog the brain of even the most intelligent layman when the term "fungus," or any of the organisms to which it is applied, is under discussion, is due, I think, to two causes. In the first place, the subject is a new one. It is not long since many of the fundamental facts concerning the fungi were new to botanists, and it is a much shorter time since public attention was first called, in this country, to the practical application of these facts to the treatment of fungous diseases. It is not yet six years since the organization on a small scale of what has grown to be the extensive and well-equipped division of pathology of the United States department of agriculture. Most of the work now in progress in the various experiment stations in many states has been begun since that time. Any new subject, with new terms and unfamiliar conceptions, seems at first strange and mysterious to the popular mind. But frequent reiteration makes the strangest things familiar and the most novel ideas natural.

In the second place, the general haziness of ideas about the fungi is due to a fundamental lack in our educational system. If long and bitter experience is beginning at last to bear fruit in the realization that the systems of the past are not all-sufficient for the needs of the present, it is still true that now, as formerly, the dominating idea in education is the literary idea. In the primary schools we have exercised our memories with facts and dates and details galore, all in the most abstract and indigestible form. We have learned to bound Beloochistan and to give the latitude and longitude of the Fiji islands; but what of the geography of our own town, or of the meaning of hill and valley, of river and ocean and island, have we

been taught to observe? We have learned of the desert and the jungle, with their peculiar and wonderful vegetation; but what of the no less wonderful world in our dooryards and beneath our very feet? We are taught by implication, if not expressly, that there is nothing about us worth seeing, and therefore *we do not learn to see*.

In our secondary education, the same tendencies and methods confirm these results. If we are offered an occasional course of so-called natural science, it is not the study of nature, but of a text-book, and is too often illustrated only by unnatural specimens of the *genus homo*, which serve as awful examples. But there are colleges and universities where the science of nature is studied at first hand, and given its rightful place as the educational equal of the dead languages, without asking their leave or begging their pardon. And if, finally, in such a place we begin to learn that the fascinations of that study are no less at home than elsewhere, we must learn at great pains, and perhaps never will, to use our faculty of observation, now almost atrophied from disuse during those precious years when it should have been developing.

But what of those to whom this revelation never comes? For them, always, the only nature worth observing is that which few of us ever see. Does any chance thrust before them some of the beautiful algæ which grow in almost every pool and ditch, they are thrust aside as "nasty slime" or "only frog spittle." If some of the smaller fungi unavoidably invade the range of their narrow vision, "nothing but a mold" or "some kind of a growth" records the speaker's contempt for anything so unrecognized in polite society as a natural object. To how many does it occur to look for beauty in any of these things, or to ask, "What is its nature?" "Why does it grow here?" "How does it grow?" "Is it useful or harmful?"

It is just because so few think of asking these questions, and because so few see the little things about them, that the fungi seem such intangible and unreal things to so many. But they are not intangible, unreal, mysterious, and it will be my effort now to give you a distinct conception of what they are.

I shall give you, not a cold, formal, precise, scientific description, but a living and practically helpful idea. You have all seen—I hope you have all *noticed*—the clusters and masses composed of innumerable tiny green threads which grow on grasses and sticks, or float on the surface, in brooks and ditches and ponds, especially in spring. If you never have noticed them, go to the nearest body of water next April and look at them. See what you can with the naked eye and any lens you may have, and then get your microscopical friend to give you a look at their real structure. It may be the beginning of a revelation to you of a world of which you have not dreamed.

You will see that these most delicate threads are strings of cells placed end to end, each with its living substance and its green pigment. You will probably see also among the threads tiny green objects of various shapes and perfect beauty, too small to be seen by the unaided eye. And a little comparison will show you that these correspond in all essential respects to a single cell of one of the threads; that they are, in other words, one-celled plants. These unicellular and filamentous plants represent the simplest forms of the great group of algæ, whose highest members are found among the brown and red "rock weeds" and "sea mosses" of our shores. Now, an essential and important point in the life of these algæ is, that they possess and are colored by the green pigment we have noticed. It is easy to prove that this pigment is the same as that in the leaves of our flowering plants and ferns and mosses, and that, through its agency, all plants which contain it are able to provide themselves with organized food material, by the combination, effected by this chlo-

rophyll, of the necessary elements taken up in inorganic form from the air and soil, or water.

But some flowering plants are not green; such as the Indian pipe and pinesap, of the Heath family; the dodder, of the morning-glory family; the whole family of broom rapes and beech drops; and the coral roots, of the orchid family. All the evidence leads to the view that these plants are the descendants of green plants, like the other members of their families, or of immediate and related families, and that they have lost their chlorophyll (or green matter) in the course of many successive generations. But why has it been lost? Doubtless because it has come to be no longer needed. We cannot doubt that these plants have gradually acquired the ability to obtain the organic substances which they require for their nourishment ready prepared. In the case of the Indian pipe, it is probable that the needed food is obtained from the decaying substances contained in the vegetable mold in which it grows.

The broom rape attaches itself to the roots of other plants and absorbs from them its food; and our dodder twines its slender stems about the golden-rod, or some other coarse herb, and relentlessly sends its root-like absorbing organs into the living tissues of its victim, which, with fine irony, science terms its "host." These plants, then, have lost their independent life and have become *parasites*, or, if their nourishment be obtained from dead organisms, *saprophytes*. As these habits become more and more completely fixed, and they have become able to live entirely at the expense of other organisms, the plants have lost their need of chlorophyll, and consequently it has ceased to be developed in their cells, in response to that economic principle of nature which provides for the disappearance of parts or structures when they are no longer of service to the organism. Leaves are chiefly organs for the elaboration of food material by the aid of chlorophyll; and in our parasitic and saprophytic plants they have in most cases been reduced to the merest rudiments by the action of this same law, which makes usefulness the condition of continued existence.

Now, having seen what has happened in highly-organized plants, is it difficult to conceive of the same thing as occurring to simple, green, filamentous algæ? Not at all. It is easy to see that, just as the dodder has become parasitic upon other flowering plants, so an alga may have become parasitic on another alga, or upon the leaf or stem or root of some flowering plant growing with it in the water or on the margin of its brook or pool. From such a beginning upon aquatic and swamp plants, we can readily believe that the parasites would spread step by step to land plants; and we need only sufficient time to account for their general distribution.

Going back to the algæ, we can readily see that some of them might easily become saprophytic by acquiring a habit of attaching themselves to decaying organisms in the water, dead leaves or stems of plants, dead frogs or insects, and similar objects. The habit once acquired, the transfer to all sorts of decaying substances on land would be easy. As the habits become fixed, our algæ would have lost their chlorophyll, just as we have seen the Indian pipe and dodder have done, and for the same reason. They would be no longer algæ, but parasitic and saprophytic fungi. There is much reason to believe that from such beginnings as I have suggested have come the wonderfully varied and complex groups of fungi which we know. Perhaps I should add a word here, lest you think the distinction between parasitic and saprophytic forms of fundamental importance. It is not at all so, as

is shown by the fact that in many cases of two closely related fungi one lives as a parasite and the other as a saprophyte. There are many cases of fungi which live parasitically at one stage of their life history and saprophytically at another; and some forms are known which can adopt either habit as circumstances dictate.

Let us glance for a moment at the saprophytic fungi. Among these are the common black and blue molds which so readily attack cooked food, especially the sugary and starchy kinds. Then come those immense groups whose spore-producing or reproductive portion is so highly developed and conspicuous as to make them the most familiar of the group—the so-called toadstools, puff balls, and saucer fungi. Closely related to the last may be named the black fungi, with a few parasitic species, notably those which produce the “black knot” of the plum and the “ergot” of rye. But it is the parasitic forms which have the most practical interest. These include the downy mildews, like those on spinach and lettuce; the powdery mildews, such as attack the cucumber and the rose under glass; and the smuts, the rusts, and scattered members of generally saprophytic groups. Besides these must be mentioned the hordes of so-called “imperfect fungi,” which are chiefly parasitic forms or stages in the history of fungi, whose final or perfect forms are saprophytic.

In spite of the amazing variety in their devices for propagation and dissemination, and the wide differences in the structure of their reproductive parts, it is well worthy of remark that the vegetative or growing parts of all these fungi are almost exactly similar, and in all cases delicate, simple threads, essentially like filamentous algae, without chlorophyll. These constitute the *mycelium* of the fungus, and from them are reproduced the threads which bear the reproductive bodies or *spores*. For our present purpose we may best class these under two heads: Those whose office is to secure the rapid propagation and spread of the fungus when conditions favor, which we may call “summer spores;” and those which can retain their vitality for a long time and preserve the species under unfavorable conditions, like those of winter or a dry season, which we will call “resting spores.”

It is, of course, the parasitic fungi which cause diseases of plants, and they are the ones, therefore, with which the economic mycologist has to deal.

Let us see a little more definitely what we mean by a fungous disease. Perhaps you will accept with me the definition which regards as disease any deviation from the normal functional activity in any of the organs of an organism. Anything, then, which prevents the development of root hairs, and so checks the absorption of water; anything which kills the leaf cells, and so stops the absorption of carbonic acid gas and the elaboration of food material; anything which destroys or distorts the wood or bark, so as to cut off the upward flow of water or the downward passage of plastic material; or anything, finally, which attacks any part of flower or fruit, so as to prevent the ripening of healthy seed or its subsequent germination, is a cause of disease, and if any of these disturbances be produced by a parasitic fungus, the result is a fungous disease. As a matter of fact, fungous diseases of all the sorts I have mentioned are well known.

The roots of the cabbage and turnip are attacked by a tiny parasite much simpler than the true fungi, but admissible under that general head, which causes the disease known as “club root” or “stump foot.” The fungus which causes the “black knot” of plum trees attacks the branches, and even the trunk, and prevents the normal distribution of food material. The functions of leaves are interfered with by innumerable “rusts” and “leaf blight” fungi of most varied sorts, and the seeds of our grains are utterly destroyed by “smut” fungi. As coming under neither

of these categories, should be mentioned fungi of great practical importance, which cause much loss to our fruit growers, by destroying or rendering unsalable our fleshy fruits. They do not harm the seed, and therefore cannot be said to interfere with the natural functions of the plant, except when they also attack leaves and twigs, as many of them do. We may instance those which cause the "rot" of peaches and plums, and the "scab" of apples and pears.

Now, fungi, as we have seen, consist of a delicate vegetative mycelium, from which arise the threads, bearing spores. When a spore germinates it produces, ultimately if not immediately, a new mycelium, and this in turn gives rise to new spores. In this respect spores correspond to the seeds of flowering plants. The mycelium of a parasitic fungus spreads itself over the surface of its host, or penetrates the tissues, making its way among or even through the cells. When the threads grow on the surface or between the cells, they commonly send into the cell cavities short branches, by which they absorb the living contents of the cells for their own nourishment. Thus the invaded tissues are killed, and the parasite is furnished with material for growth into fresh territory and for the development of its spores. By means of the spores fresh plants are attacked, and so the fungus thrives and the disease spreads. A fungous disease is, then, a contagious disease. The killing of the living tissues whose life is the health of the plant must evidently result in its weakening, and often, finally, in its death.

Another important question which often presents itself is, whether a fungus may not attack several related hosts, and thus, while we are trying to exterminate it upon one, be flourishing unobserved upon another, perhaps near by. In the cases of several fungous diseases of our cultivated plants, some neighboring spontaneous plant may be an important factor in propagating the disease.

One of the first practical results of the widest practicability, which is deduced from what we already know of the fungi, is the fact that treatment, to be efficient, must be *preventive* rather than remedial. It may be stated as a general principle, not wholly without exceptions, that a leaf, a fruit, a plant, once attacked, is lost. Let us see, then, what can be done by way of preventing the attacks of fungi. It is a very trite saying that "an ounce of prevention is worth a pound of cure;" but, when cure is impossible, the value of prevention becomes infinitely increased. Of the first importance among preventives of disease must be mentioned healthful conditions. This seems like the statement of a very self-evident truth; yet much disease among cultivated plants is the result of disregard of this fundamental principle. A strong and vigorous plant, with abundant food at its disposal, will resist the attacks of fungi, which would easily gain a footing on weaker ones, or will feed both itself and its parasite, with comparatively little harm to itself.

But abundant nourishment is not the only condition of health. No practice is more common among our fruit growers than to leave in the vineyard and the orchard, lying on the ground or hanging from the branches, the dead fruits of the season which have been rendered worthless by fungi. Nothing could produce more unhealthful conditions, for these dead fruits commonly furnish to the fungi which attack them precisely the most favorable soil for further and complete development. In the next spring the air is full of the spores of these fungi, which find lodgment on the new leaves and fruits of the very plants on which they grew last year; and so the story goes, year after year. In a word, keep your orchards and gardens and greenhouses *clean*. Allow no rubbish to be about on which fungi can breed. Remove and destroy all diseased fruits or plants as scrupulously as you pre-



serve salable ones, and you will have more salable ones to preserve. It is surprising how far generous culture and clean culture will go toward preventing fungous diseases, without special treatment.

But in many cases the application of special protective preparations is of the greatest value, and is even necessary. It has often been the means of restoring to healthful growth and bearing plants which had become worthless and half dead from disease. Such a large proportion of parasitic fungi enter their hosts by way of the leaves or succulent stems, that it is evident a great amount of loss can be avoided if we can find some substance which, when applied to the surfaces of tissues subject to attack, will, without injury to them, prevent the development of fungus spores.

Experimenters along this line early turned their attention to various compounds of copper, led by their well-known antiseptic and poisonous properties. And it has been found that various dilute preparations of sulphate and carbonate of copper possess all the desirable qualities of harmlessness to the surface of the plants and ample fungicidal power. The names of the Bordeaux mixture and the ammoniacal carbonate of copper are familiar to you all. They are, as you know, applied in liquid form, by means of a suitable force pump and spraying nozzle; and their protective action is easily understood. The liquid, reaching every part of the plant in the form of fine spray, soon dries by evaporation, leaving behind a delicate film of copper in the form of its hydrate, which adheres closely to the surface of the plant.

Now, while the waterproof coating of all parts of the plant is unaffected by this film, it is sufficient to prevent the germination of any fungus spores which may fall upon it, and thus secures the plant against attack. Of course the ordinary incidents of our changing weather gradually wears off this "copper plating," and thus the plant becomes exposed again. It is therefore necessary to repeat the spraying every 10 or 15 days during the time that they are the most liable to attack. This time, of course, varies with the habits of the different fungi. Let me emphasize again the essentially *preventive* nature of this treatment. After the plant is attacked, no amount of spraying is of any service, and the whole secret of success with fungicides lies in their *thorough application early enough and often enough*.

#### NOTES FROM FURTHER REMARKS BY PROFESSOR HUMPHREY.

*First.* ORIGIN OF FUNGI: Away back in geologic time, doubtless fungi must have been evolved from water plants; but it will not do to assume this of all these plants at present.

*Second.* GRAIN RUST AND SMUT: These differ in regard to healthfulness. Rusted grain, when cut and dried, would not, I think, injure cattle when fed to them. The rusts are destructive fungi, but not dangerous to animal life.

*Third.* CLOSE PLANTING CONDUCTIVE TO FUNGUS DEVELOPMENT: Crowded planting would be a cause of insufficient nutrition. Of course, you can give plenty of nutrition; but even then the plants would be susceptible to injury from fungi on account of insufficient light and the retention of rain and dew upon them, which would favor the development of fungi.

*Fourth.* A FINE SPRAY MORE SUCCESSFUL THAN A COARSE ONE: (1) It is more economical. (2) It forms a thinner film upon the surface, and hence dries more quickly, which increases its durability, as in case of a shower soon after its application it will not so readily wash off.

*Fifth.* LIME IN BORDEAUX MIXTURE: It should be so thoroughly worked in as to make a fine mixture, and it is worth while to take time and pains to get it into that condition, because it is then so much more effectual.



## WHAT ARE BACTERIA? WHAT ARE FUNGI? AND THEIR RELATIVE CLASSIFICATION.

U. S. DEPT. OF AGRICULTURE, DIV. OF VEGETABLE PATHOLOGY,  
WASHINGTON, D. C., November 19, 1892.

Mr. G. C. Brackett, Lawrence, Kas.:

DEAR SIR—In reply to your letter of the 14th, I would reply to your questions as follows:

1. The general term *bacteria* is applied to a large group of micro-organisms which are universally distributed throughout the air and (one might almost say) the earth. They are present in various forms in the human body, and are active agents in digestion as well as in all fermentation and putrefaction. They are, according to modern ideas, the cause of many human and animal diseases, and, as far as we know, of some plant diseases also. Cholera, for example, is due to one of the bacteria, as are also diphtheria, anthrax, and other diseases. It is generally supposed that all the forms are plants of a very low organization, and they are ordinarily placed in the lowest group of fungi, under the name of *Schizomycetes*. The yeast plants are closely allied to bacteria.

2. The term *fungi* is applied to a low class of plants which are without any green coloring matter, and which live either in the tissues of living beings or on dead or decaying organic matter. There are a great many thousand species, and there have been many different classifications, so it is scarcely possible to give even an outline.

3. The relation between bacteria and fungi has already been referred to. The former are frequently classed as the lowest members of the latter. But the difference between a bacterium and a mushroom, using this word in its ordinary sense, is almost as great as between a frog and a man.

### THE CAUSE OF PEAR-TREE BLIGHT.

It has been definitely ascertained to be a minute organism, a bacterium, which first finds lodgment in the nectar of pear blossoms and other tender parts; feeds upon and multiplies in these, and thence works its way down into the growing shoots. If not arrested, it will eventually cause the death of the branch, and finally the tree.

Respectfully, B. T. GALLOWAY, *Chief of Division*.

## NOTES ON NEW METHODS OF COMBATING SOME COMMON FUNGUS DISEASES OF FRUITS.

READ BEFORE THE IOWA HORTICULTURAL SOCIETY, BY PROF. B. T. GALLOWAY, CHIEF OF DIVISION OF VEGETABLE PATHOLOGY, DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

The object of this paper is to briefly call attention to some of the methods now employed in combating the fungous diseases of fruits. Within the past few years our knowledge on this subject has materially increased, every season bringing to light new and improved methods. It is in the light of these we propose to speak, hoping that what is said may be of direct benefit to the fruit grower, or at least that it may lead him to a better understanding of the subject.

Taking up first the diseases of the apple, it may be said that "scab," one of the worst foes of this fruit, can now be easily and cheaply prevented. The past season's experiments lead us to believe that Paris green may prove as effectual in treating apple scab as any of the copper compounds. The question, however, is one that

needs further research, as, so far, we have only one set of experiments bearing on the subject. If it is found that Paris green is as effectual as the fungicides now generally used, considerable saving will result, as scab and the Codlin Moth can be treated at the same time. Owing to the poisonous nature of Paris green, it would probably not be desirable to use it more than two or three times, in the early part of the season. For the rest of the treatments, the copper compound should be used. This plan would not interfere with the usual method of treating the Codlin Moth. Aside from the foregoing plan, which, as already stated, cannot be recommended unqualifiedly, there are two other methods of treating scab, either of which, in all ordinary seasons, will prove entirely satisfactory. Briefly, they are as follows:

1. When the trees are in bloom, spray with the ammoniacal solution of copper carbonate, made by dissolving five ounces of copper carbonate in three pints of strong ammonia, and diluting with water to 45 gallons. Spray a second time when the fruit is the size of peas, and again two weeks later. In rainy seasons, two additional treatments, made at intervals of two weeks, will pay.

To obtain the best results from the work, one or two points should be observed. First, the copper carbonate should be moistened slightly with water before the ammonia is added; we usually add just enough water to make a thick paste, and, as a result, the copper readily dissolves when the ammonia is brought into contact with it. Another important matter to bear in mind is the manner of applying the solutions. A good, strong spraying pump, provided with suitable nozzles, is absolutely necessary to insure the best results; we usually employ a double-acting pump, which is provided with two discharge hose, each about 14 feet long. The hose are fitted with Valmorel nozzles, and the entire outfit is mounted on a barrel and placed on a wagon, which is driven between the rows of trees, and, while one man pumps, two others, standing on the ground, direct the spray over the trees. In order to readily reach the tops of the trees, the nozzle and a foot or more of the hose are wired to a cane pole 12 or 14 feet long.

2. The second method of treating the scab is exactly like the first, excepting the Bordeaux mixture is used instead of ammoniacal solution. The mixture is made by dissolving six pounds of copper sulphate or bluestone in 8 or 10 gallons of water. Four pounds of fresh lime are then slaked, and enough water added to make a thick cream. This is then poured into the copper solution, after which enough water is added to bring the whole up to 45 gallons. It is best to dissolve the copper in a barrel, prepare the lime in another vessel, then pour the latter into the former and add water until the barrel is full. Before using, the mixture should be thoroughly stirred.

Next to scab, probably, the most destructive fungus occurring on the apple is powdery mildew, which, for the most, is confined to young trees in the nursery. This fungus may be largely prevented by the application of the ammoniacal solution. The first spraying should be made when the leaves are one-third grown, after which four or five others should follow at intervals of two weeks.

Pear-leaf blight and scab may be prevented by following the second line of treatment recommended for apple scab. "Fire blight," the greatest enemy of the pear, has as yet refused to yield to treatment. The disease, however, has been under investigation by the department of agriculture for some time, and it is believed that it will eventually be conquered.

Turning our attention to grape diseases, we may say that recent experiments warrant us in stating that the best results in treating black rot will follow the use of the Bordeaux mixture of the same strength recommended for apple scab. The first application of this preparation should be made when the buds begin to swell; the second, when the leaves are about one-third grown; and the third, when the grapes

are in bloom. After this, sprayings should be made at intervals of two weeks, until the berries show signs of ripening. The ammoniacal solution, in most cases, will prove as effectual as the Bordeaux mixture, although it sometimes injures the foliage of certain varieties. Downy mildew may be prevented by the same treatment recommended for black rot, although, where this disease occurs alone, it is not necessary to begin the treatments until after the fruit is set.

#### NECESSITY OF SPRAYING APPLE ORCHARDS IN A WET SEASON.

BY PROF. E. G. LODEMAN, AGRICULTURAL EXPERIMENT STATION, ITHACA, N. Y.  
[BULLETIN NO. 48.]

Experiments in spraying for apple scab and apple worm were made this year in the orchard of John J. McGowen, a fruit grower living near the university farm. The orchard consists principally of King and Baldwin apples. Several other varieties are grown, and other experiments than those here recorded were made, but, owing to the limited number of trees and the lightness of the crop, the results obtained from these were unsatisfactory; but definite results were obtained from the Kings and Baldwins.

The summer's work is particularly interesting, from the fact that the season was very wet, the rainfall from June 1 to July 1 being as follows:

JUNE.	1	2	3	4	5	9	10	16	17	18	19	22	24	27	30	Total.
Rainfall, in inches.....	.8	1.11	.76	.32	.08	1.16	.02	.07	.16	.02	.28	.25	.01	.64	.29	5.30

The total rainfall is 1.31 inches above the average for the month. Most of the days during which no rain fell were cloudy and warm, and the atmosphere was moist. The first week in July was also rather wet, but later the rainfall was considerably less. Such conditions are generally supposed to favor the development of the apple scab (*Fusicladium dendriticum*), and perhaps also other fungi which work upon the trees. The rains also wash off the materials which are applied to the trees. On examination of diseased fruit taken from the orchard in which the experiments were made, it was found that a large part, if not all, of the injury done to the apples by fungi was primarily caused by the apple-scab fungus. The leaves were also more or less injured, but this was due partly to the action of other fungi, as well as the apple scab. However, the latter may be considered as the worst pest, and any treatment which will effectually check it will undoubtedly render the others harmless also.

The life history of the fungus has not been well determined. Mr. Fairchild, of the division of pathology, at Washington, writes me that the infections take place earlier in the season than was supposed; in fact, that it is probable that the disease often obtains a foothold even before the petals fall from the trees. The experiments made here the past season tend to confirm the statement. The application of some fungicide before the buds of the apple open will probably be as valuable as any later treatments which may be given. When the fungus has once penetrated the plant tissues, there can be no efficient remedies for it. The fungicide should be upon the tree before the spores of the fungus germinate; and those of the apple scab occasionally seem to be growing even before the opening of the first leaf buds. The apple scab first appears upon the fruit in the form of grayish, slightly-sunken spots. These generally are circular at first, but when several grow together their outline is irregular. As the spot enlarges, the center becomes quite dark, even black. At the edges may be seen the epidermis or skin of the apple; it is loosened

by the disease, and forms a light-colored line which plainly divides the diseased from the healthy tissues (Fig. 2, next page).

The Codlin Moth lays its eggs early in the spring in the blossom end of the apple, before the fruit has turned down. The larvæ, or worms, which develop from these eggs, make the apples wormy. The time for fighting this pest is fortunately the same as that for the apple scab, and in this fact lies the value of a combination of insecticides and fungicides. As soon as the apples hang down, the arsenite may be omitted, but the use of the fungicide may still be advisable.

The pruning and the spraying of fruit trees are two subjects which are closely related. This is especially true in the case of the apple. Moisture is favorable to the development of the apple-scab fungus. When the tops of the trees consist of a tangled mass of large and small branches, they are much longer in drying out than when they are open. Not only is a shelter given to fungi, but their growth is encouraged, and each tree becomes the distributing center of some disease. The mischief is also aggravated by the fact that it is as difficult for any remedies to gain an entrance as it is for the light and air. It is impossible to spray such trees to advantage, even granting that the fruit borne by them would warrant the expense. The head of the tree should be open, so that all parts may be reached easily with the spray.

The actual expense of spraying is also largely increased when the tops of the trees are not well pruned. A well-sprayed apple tree has its leaves and fruit covered with a thin layer of the material applied, so that the poison will be present wherever a spore may fall or an insect feed. If the work is not done in this manner, the tree remains more or less unprotected. It naturally follows that a tree bearing many unnecessary branches will require more material to protect it. But much material is also wasted in trying to spray through these branches, or past them, in order to reach more important parts of the tree. Again, this extra work requires time. During the spring of the year there is generally plenty of work to be done, and extra help is expensive. It is no small task to spray an orchard, as those who have tried it well know, and everything that will make the work easier is worthy of attention.

#### PART I. EXPERIMENTS OF THE SEASON.

Until recently, insecticides and fungicides have been applied separately. The following experiments were made to determine the value and practicability of spraying apple orchards with a combination of insecticides and fungicides. From the good results which have commonly followed the use of Paris green, it was thought possible that it might have some value as a fungicide when used alone. Applications were made to test this point. The combinations applied were Paris green and the Bordeaux mixture, and London purple and the Bordeaux mixture. Paris green was also used alone. The arsenites were used at the rate of 2½ ounces to 40 gallons of



FIG. 1. [By E. G. Lodeman.]

liquid, which is the equivalent of one pound to about 250 gallons. The Bordeaux mixture was made according to the formula:

Sulphate of copper (crystals).....	6 pounds.
Lime (unslaked).....	4 pounds.
Water.....	40 gallons.

The sulphate of copper dissolves very slowly in cold water. It is better to buy it in the form of a powder, or to use boiling water, which dissolves it more quickly. Four or five gallons of hot water should readily dissolve enough of the copper sulphate to make 40 gallons of the mixture. It is better to use quicklime, but that which has been air slaked will also answer the purpose, if about one-fourth more is used.

The arsenites were added to the mixture just before the applications were made to the trees. The mixtures were carried in the orchard in a barrel holding 40 gallons, and lying horizontally upon a wagon. The pump used was No. 549, of the Deming Company, Salem, Ohio. It was secured to the top of the barrel, as shown in illustration (Fig. 1). A hose, which discharges into the barrel for the purpose of keeping the mixture stirred, may be attached to the pump, but this was not used. The liquids were stirred by means of a stick, which was inserted into the barrel through the hole used in filling. A thorough stirring was given before spraying each tree. It was found that two persons working together could do the work most satisfactorily; one drove and directed the spray, while the other pumped. The nozzle used was one invented by the owner of the orchard. It throws a fine spray with much force, which makes it well adapted for orchard work.

The amount of liquid applied to each tree averaged about  $4\frac{1}{2}$  gallons per application. The trees are about 20 years old. They are thrifty, and in excellent condition. The retail price of the sulphate of copper is about 8 cents per pound, and Paris green is sold for about 35 cents.\* Adding the cost of the lime, at 30 cents per bushel, this makes the actual outlay per tree for material about 5 cents for each application of the combination of Bordeaux mixture and Paris green. If London purple were used, it would reduce the cost a little; for this poison should sell for about 20 cents a pound, retail. If Paris green is used alone, the cost of each application is less than 1 cent per tree. Two men should spray from 100 to 125 trees per day, and do the work well. Counting the cost of applying at 2 cents per tree, this makes the total cost of each application of the combined insecticides and fungicides 7 cents per tree, or about 25 cents for four applications, this number being perhaps sufficient in even very wet seasons.

Most of the petals of the blossoms fell from the trees June 6 and 7. The first application was made June 13, the weather in the meantime being warm and damp. This application was without doubt delayed too long; for at the time of the second application, June 22, diseased spots could be found, both upon the young fruits and upon the leaves, in some of the places which were thickly covered with the Bordeaux mixture, thus showing that the work of the fungus began very early in the season. The first application should be made, at the latest, immediately after the blossoms fall, and it is probable that good results will follow one made earlier.

The orchard was sprayed a third time July 1, and again July 22, the mixture in each case being prepared as for the first application.

The apples were harvested early in October, and at that time they were carefully examined with regard to the amount of scab<sup>a</sup> and number of worms present. The yield from two to four trees of each lot sprayed was counted and graded. In most cases all the apples borne by the tree were examined, but occasionally only a portion sufficiently large to give a fair estimate of the character of the yield. The

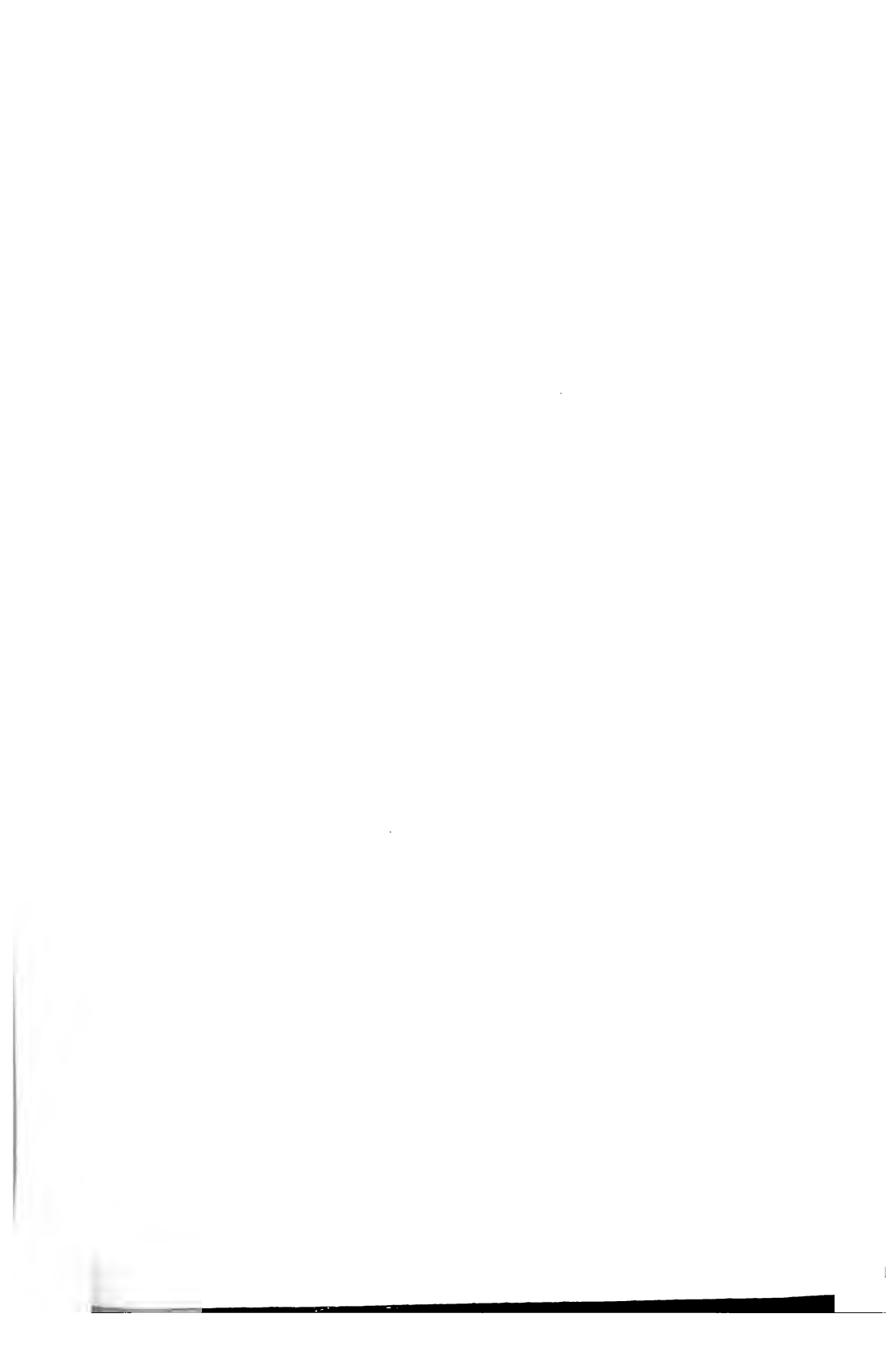
\*Can be had at Kansas City, Mo., at 18 cents per pound, in lots of 100 pounds.—SECRETARY.

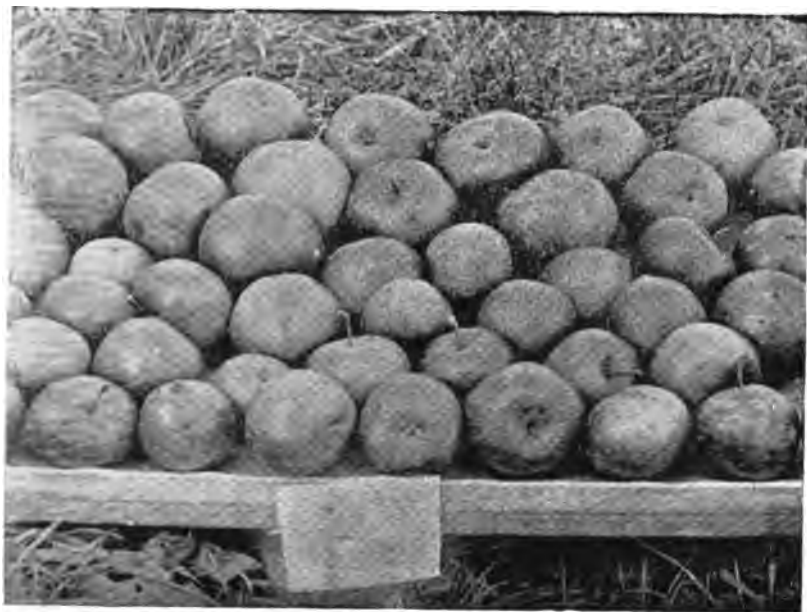


FIG. 2.—Apple Scab on the Fruit.



FIG. 3.—Kings not sprayed. Observe that these are smaller than in Figs. 4 and 5.





**FIG. 4.**—Kings sprayed with Bordeaux mixture and London purple.



**FIG. 5.**—Kings sprayed with Paris green. Observe that these fruits are larger than those in Fig. 3.





second, ranking as first class, or those whose market value had not been affected by insects or fungi, although attacked; third, ranking as second class, or evaporating apples, those whose market value had been more or less reduced by insect or fungous injuries, the apples as a rule being smaller than the above, but not seriously misshapen; fourth, cider apples, or all those remaining after the preceding grades had been removed. The apples of each grade were counted, as was also the number of wormy ones borne by each tree. The following table shows the result; the numbers represent the average of the results obtained from the different trees:

<i>Variety.</i>	<i>Treatment.</i>	<i>Average per cent. third and cider apples.</i>	<i>Average per cent. gain as compared with check.</i>	<i>Average per cent. wormy.</i>	<i>Average per cent. gain.</i>
King.....	Check.....	89.7	.....	25	.....
King.....	Bordeaux and Paris green.....	55	34.7	1	24
King.....	Bordeaux and London purple.....	59	30.7	3	22
King.....	Paris green.....	72	17.7	2	23
Baldwin.....	Check.....	74	.....	38	.....
Baldwin.....	Bordeaux and Paris green.....	52	22	9	27
Baldwin.....	Bordeaux and London purple.....	67	7	15	23
Baldwin.....	Paris green.....	58	16	4	34

It will readily be seen from the large proportion of poor fruit shown by the table that the season was one which would put to a severe test any application that might be made. Nearly nine-tenths of the King and three-fourths of the Baldwin apples on the unsprayed trees had but little market value, and from 25 to 38 per cent. of them were wormy. Fig. 3 is a photograph of an average lot of untreated King apples. These untreated apples are smaller than the treated ones, although this fact may not be noticed at first glance in the much-reduced illustrations. But the gain in size and uniformity in Figs. 4 and 5 is considerable.

The combination of Bordeaux mixture and Paris green reduced the per cent. of scab in both Kings and Baldwins to a trifle more than 50 per cent.

The combination containing the London purple was not so effective, for 59 per cent. of the Kings and 67 per cent. of the Baldwins were badly injured. Fig. 4 is a fair representation of apples treated with this combination.

The action of the Paris green is particularly interesting. When used alone, it reduced the injury from scab upon the King apples 17.7 per cent.; upon the Baldwins, 7 per cent. This unequal gain may probably be explained to a certain extent by the fact that the Baldwins were not so severely attacked. When used with the Bordeaux mixture upon the Kings, a gain of 4 per cent. stands in favor of the Paris green when compared with the London purple, while in the case of the Baldwins the gain is 15 per cent. This would go to show that Paris green possesses marked fungicidal properties, but it is not so valuable in this respect as the Bordeaux mixture (Fig. 5).

By comparing Fig. 3 with Figs. 4 and 5, it will be seen that the sprayed apples are decidedly larger than those not treated. This may possibly be but the natural variation in the size of the fruit borne by different trees, but since the unsprayed trees bear uniformly smaller fruit it is scarcely probable that the applications were not in some way connected with the increase in size. And this agrees with results obtained in Ohio during 1891 by W. J. Green.\* He found that, "aside from the inferior appearance of scabby fruit, the effect of the scab is to retard the growth of both foliage and fruit; hence, scabby apples are smaller than those free from scab. The difference in size between apples that are affected with scab and

\* See Bulletin Ohio Experiment Station, December, 1891.

those that are free from it is not the same with all varieties, nor with any given variety in different localities. That the difference may often be considerable is shown by some comparisons made between scabby Newtown Pippins and those that were free from the disease. One bushel of that variety that was free from scab was found to contain 202 apples, while the same quantity of scabby apples contained 817 apples. The average weight per apple was 4 and 2½ ounces respectively. This comparison was between extremes, but those of the second class were, in size, far below those that were free from scab. It is no doubt true that scab may cause a diminution in size of 50 per cent., but in most cases the loss is below that figure. In all cases scab hinders development, but not always in proportion to the amount found upon the fruit. Wherever scab is present at all, either upon fruit or leaves, the effect must be considerable in arresting the development of the fruit."

The effect of the applications upon the larvæ of the Codlin Moth was very marked. When the Paris green was applied alone, it reduced the injury from 25 per cent. to 2 per cent. in the case of the King apples. The Baldwins showed a marked difference, also, the reduction being from 38 per cent. of wormy apples to only 4 per cent. When applied with the Bordeaux mixture upon the King apples, the per cent. of wormy fruit was even less than when the Paris green was applied alone; but the reverse is true in the Baldwins. The experiment indicates that the beneficial action of Paris green as an insecticide is not materially affected by the Bordeaux mixture when the two are applied together.

The results obtained when London purple or Paris green was added to the Bordeaux mixture indicate the comparative value of such combinations. In the King, the number of wormy apples was reduced to 1 per cent. by the Paris green and to 3 per cent by the London purple. The Baldwins show a reduction to 9 per cent. by the Paris green and to only 15 per cent. by the London purple. In each case the result is in favor of Paris green.

The foliage of the trees was uninjured, except in the case of the Paris green applied alone. Some trees and parts of trees to which this had been applied looked thinner than the rest of the orchard during the latter part of the season. The leaves were undoubtedly somewhat injured by the Paris green, but not sufficiently to weaken the trees to any extent. The cause of the injury is undoubtedly due to the amount of arsenic which entered into solution. This was found by analysis to be about one-half of 1 per cent. (.63) of the total amount. The addition of a little lime would have destroyed all caustic action, for no injury could be seen where the Bordeaux combinations were used. A sample of London purple has been analyzed by the station chemist. It was found that about 50 per cent. of the arsenic was soluble, and it is this dissolved arsenic which injures foliage.\* On account of its caustic properties, the London purple was used only in connection with the Bordeaux mixture.

## PART II. THE PREVALENCE OF APPLE SCAB.

Early in October, a circular was sent from this station asking for information regarding the degree in which the varieties of apples were attacked by the scab fungus. The varieties were to be divided into three classes: First, Those whose market value is practically ruined every year, as the Fameuse or Snow apples; second, those whose market value is not seriously affected, as the Baldwins; and, third, those which are entirely free from scab. The division was to be based upon the amount of scab found upon the fruit. Many growers responded. Although the data are not so complete as might be desired, still the resistant powers of many varieties are shown in the tables given below. The matter is a difficult one to study, and it is

\* See Cornell Exp. Sta. Bulletin No. 18, July, 1890.



hoped that apple growers, in whose interest this work is being done, will watch the disease next summer and report any results that may be of interest in time for publication in a succeeding bulletin. The newer varieties should receive particular attention, for among them there are undoubtedly some that withstand the attacks of the scab much more than others; it will be interesting to know whether they will remain so. Some parts of the trees also appear to be more injured than others. In some varieties the fruit suffers more than the leaves, and in others the reverse is true. Location also influences the amount of scab present in an orchard. It is the common opinion that the disease is worse in low, wet places, but all growers do not agree with this statement. The character of the soil is another important factor to be considered. Is the disease as serious upon well-drained land as upon that which is not drained? Are there any neglected trees or orchards in the neighborhood which might explain the presence of the scab fungus in an orchard or certain parts of an orchard? To what extent do the amount and the time of rainfall affect the prevalence of the disease? These and many similar questions still demand the attention of apple growers, and any notes that may throw light upon the subject will receive attention if reported at this station.

The following table has been prepared in order to compare, so far as possible, the extent to which each variety is subject to the apple scab, or other injurious fungi. It is scarcely probable that all the injury to the apples is due to the apple-scab fungus. The varieties named in the last table, in the column marked "Free," are first considered. Many of them were also mentioned in the other columns. Next are considered those varieties found in the column marked "Not seriously affected;" and finally those found in the column "Habitually badly affected." The figures in the columns refer to the number of times the variety was mentioned in the given categories by the respondents:

VARIETY.	Habitually badly affected.	Not seriously affected.	Free.	VARIETY.	Habitually badly affected.	Not seriously affected.	Free.
Garden Royal.....	1	1	1	Trenton Early.....	2	2	2
William's Favorite.....	1	1	1	Nonesuch*.....	4	4	4
Ontario.....	1	1	1	Starkey.....	3	2	2
Pumpkin Sweet.....	1	1	1	Royal Limber Twig.....	2	1	1
Paradise Sweet.....	1	1	1	Yellow Transparent.....	2	1	1
Sapson.....	1	1	1	Wealthy.....	2	1	1
Hurlburt.....	1	1	1	Mother.....	2	1	1
Lady Winter Sweet.....	1	1	1	White Pippin.....	2	1	1
Red Winter Sweet.....	1	1	1	Sweet Bough.....	2	1	1
Summer Rose.....	1	1	1	Pennock.....	2	1	1
Cannon Pearmain.....	1	1	1	Vandevere.....	2	1	1
Magnum Bonum.....	1	1	1	Ben Davis.....	13	8	8
Hall.....	1	1	1	English Russet.....	4	2	2
Kernodle.....	1	1	1	Minkler.....	3	2	2
Buckingham.....	1	1	1	Jonathan.....	10	4	4
Colton.....	1	1	1	Golden Sweet.....	3	2	2
Green Sweeting.....	1	1	1	Oldenburg.....	7	3	3
York Imperial.....	1	1	1	Benoni.....	4	1	1
Rareripe.....	1	1	1	Willow Twig.....	8	3	3
Lady's Sweeting.....	1	1	1	Fallawater.....	5	2	2
Early Ripe.....	1	1	1	Sops of Wine.....	3	1	1
Gravenstein.....	1	3	3	Twenty Ounce.....	4	1	1
Porter.....	1	3	3	Talman Sweet.....	1	1	5
Roxbury Russet.....	2	5	5	Golden Russet.....	1	1	4
Grimes's Golden.....	6	7	7	Pennock.....	1	1	1
King.....	5	6	6	Gilliflower.....	1	1	1
Sweet Russet.....	1	2	2	Lowell.....	1	1	2
Detroit Black.....	1	1	1	Hunt.....	1	1	1
Keswick.....	1	1	1	Early Joe.....	1	1	1
Fall Orange.....	1	1	1				

\* Presumably Hubbardston.

VARIETY.	Habitually badly affected.	Not seriously affected.	Free.	VARIETY.	Habitually badly affected.	Not seriously affected.	Free.
Peck's Pleasant	1	2	2	Primate	1	1	1
Seek-no-further	2	2	3	Buckingham	1	1	1
Esopus Spitzenburg	2	2	1	Winter Sweet Paradise	1	1	1
Baldwin	2	13	5	Cream	1	1	1
Missouri Pippin	6	2	2	Summer Queen	1	1	1
Maiden's Blush	1	10	3	Lansingburg	1	1	1
Rambo	4	5	1	Lady	1	1	1
Red Astrachan	3	11	3	Mellinger	1	1	1
Northern Spy	6	10	3	Smily	1	1	1
Smith's Cider	2	6	1	Lucy Pew	1	1	1
Winesap	9	7	1	Wagener	1	5	5
Early Harvest	13	3	1	Roman Stem	1	5	3
Yellow Bellflower	7	5	1	Chenango	1	3	3
Newtown Pippin	5	2	1	Clayton	1	3	3
Fall Pippin	6	1	1	Pryor's Red	1	2	2
Carolina June	8	1	1	Jeffers	1	2	2
Catshead	1	1	1	Horse	1	2	2
Chalamoff	1	1	1	Wythe	1	2	2
Pomme Gris	1	1	1	American Summer	1	2	2
Thaler	1	1	1	Bawle's Genet	1	11	11
Jewett's Fine Red	1	1	1	Rhode Island Greening	2	10	10
Deane	1	1	1	Gilpin	1	3	3
Tift Sweet	1	1	1	Red Canada	3	4	4
Lady's Sweet	1	1	1	Rome Beauty	6	6	6
Early Williams	1	1	1	Dominie	2	3	3
Leicester Sweet	1	1	1	Orange Pippin	1	1	1
Magnolia	1	1	1	White Pippin	1	1	1
Virginia Beauty	1	1	1	American Golden Russet	1	1	1
Edward's Winter	1	1	1	Michael Henry Pippin	1	1	1
Mountaineer	1	1	1	Pound Sweet	1	1	1
Carolina Beauty	1	1	1	Swaar	1	1	1
Bailey's Sweet	1	1	1	Early Strawberry	1	1	1
Tetofsky	1	1	1	American Pippin	1	1	1
Early Chandler	1	1	1	Rock Pippin	1	1	1
Colvert	1	1	1	Ribston Pippin	1	1	1
Cheese	1	1	1	Belmont	2	1	1
Fanny	1	1	1	Huntsman	3	1	1
Marion	1	1	1	Fameuse	17	1	1
Autumn Strawberry	1	1	1	Pomme Royal	1	1	1
Melon	1	1	1	Hoyt Sweet	1	1	1
Minister	1	1	1	Mexico	1	1	1
Salome	1	1	1	Rolfe	1	1	1
Cogswell	13	1	1	Pearmain	1	1	1
McClellan	1	1	1	Y. Greening	1	1	1
Gano	1	1	1	Early Burden	1	1	1
Hunt	1	1	1	Spice	1	1	1
Detroit Red	1	1	1	Cranberry Pippin	1	1	1
Hightop Sweet	1	1	1	Douce	1	1	1
Indiana Red Streak	1	1	1	Faust	1	1	1
Baltimore	1	1	1	Wine	2	1	1
Pound Royal	1	1	1	Ortley	2	1	1
Holland Pippin	1	1	1	McIntosh	2	1	1
May (Rheinish)	1	1	1	Early Harvest	2	1	1
Hewes	1	1	1	Jersey Sweet	2	1	1
Whitney	1	1	1	McAfee	2	1	1
Red Winter Pearmain	1	1	1	Newark (Pippin)	2	1	1
Sweet Bellflower	1	1	1	Cooper's Early	2	1	1
Binny Sweet	1	1	1	Milam	2	1	1
Harrison	1	1	1	Fulton	2	1	1
Gilpin	1	1	1	Ridge	2	1	1
W. Pearmain	1	1	1	Carolina June	4	1	1
Liever	1	1	1	Ortley	5	1	1
Limber Twig	1	1	1	White Winter Pearmain	10	1	1

It is difficult to draw conclusions from the above table. Many of the varieties are mentioned only once, and this is not sufficient evidence to show their power of resisting the attacks of fungi. The system of tabulation does not show accurately the comparative value of the different varieties, even those which have been reported by several growers. Taken as a whole, however, the table shows a gradually-increasing susceptibility to injury, as the list is followed from the first to the last.

The first 21 varieties in the table have been reported in the "Free" column alone; but of these, not one was reported more than once; so it is obviously unfair to say that they are varieties which are not subject to the attacks of fungi. In going down the list, it is seen that as soon as more than one observer mentions a variety, it also falls into another column; showing that one observation is insufficient. Many varieties are found in the three columns; but, here, fairly accurate conclusions may be drawn by a comparison of the figures. It may be assumed that the Baldwin, Seek-no-further, Red Astrachan and some others are comparatively free from scab; while the Winesap, Early Harvest, Carolina June and others are much injured. Many varieties are placed high on the list because some observers reported them free in a certain locality, and still the large majority of reports place them in one of the two remaining columns.

#### SUMMARY.

1. The apple-scab fungus (*Fusicladium dendriticum*) attacks apple trees very early in the season, even before the petals fall to the ground.

2. The first application of a fungicide should be made early, no later than immediately after the petals fall; an application made just before the buds open would probably be of value.

3. The time for combating the Apple Worm is immediately after the petals fall, and the treatment should be repeated once or twice until the apples begin to hang down.

4. Apple trees should be pruned so that all parts may easily be reached by a spray; well-pruned trees allow free access of light and air among their branches, which prevents fungi from obtaining so strong a foothold.

5. The injury done by the apple-scab fungus was decidedly reduced where the Bordeaux mixture was used.

6. When Paris green was added to the Bordeaux mixture, the fungicidal action of the combination was more marked than when London purple was used in place of Paris green.

7. Paris green has a certain fungicidal value, but in this respect it does not nearly equal the Bordeaux mixture.

8. The value of Paris green as an insecticide does not appear to be materially affected whether it is applied alone or in combination with the Bordeaux mixture.

9. The insecticidal value of Paris green when used with the Bordeaux mixture was greater than that of London purple when similarly applied.

10. More applications are required during a wet season than during a dry one; during wet weather they should be repeated every 7 to 10 days.

11. The results obtained this season from the application of a combination of the Bordeaux mixture and Paris green or London purple show that the use of such a combination is valuable and practicable for the treatment of apple-scab fungus and the Apple Worm, even in a wet season.

12. The apple scab is found in all regions in the United States from which reports have been obtained.

13. It is probable that none of our commonly-cultivated apples are in all seasons free from scab.

14. Some varieties are much more subject to the disease than others.

## THE PROFITS OF SPRAYING APPLE ORCHARDS.

BY PROF. E. G. LODEMAN, BULLETIN NO. 60, EXPERIMENT STATION, ITHACA, N. Y.

Spraying orchards to protect the foliage and fruit from the attacks of insects and fungi may now be considered as one of the regular duties connected with the growing of apples. Those who have had experience in this direction are practically unanimous in saying that not only does it pay to spray apple orchards, but it generally pays well. Doubts as to the advisability of making applications to orchards are rapidly disappearing, and now arise the questions, what to apply, and how and when to make the applications. The following experiments were designed to indicate as accurately as possible what are the best methods of treating apple orchards so that fruit of the best quality may be obtained with the smallest outlay of labor and money.

*Description of the Orchard Used in the Experiments of 1892 and 1893.*—The orchard of John J. McGowen was selected for the work. This orchard covers about two acres, and is situated upon a strong clay loam. The land is moderately rolling, so that fairly-good drainage is afforded. The trees were set in 1869, making the orchard now 24 years old. However, many of the trees first set have died at varying intervals, so that the orchard is not uniform. Most of the trees used for filling vacant places are Baldwins, and many of these are now coming into bearing. Nearly one-half of the trees originally set and now in bearing are King; the other varieties in full bearing are Baldwin, Fall Pippin, Maiden's Blush, Fallawater, Red Astrachan, Chenango Strawberry, and Westfield Seek-no-further. The last two varieties were not used in the experiments.

The care which the orchard received from the time of setting has been as follows: During the first three years the land between the rows of trees was used for raising grain and hay. It was then seeded down and sheep were put in. The sod has not been broken since it was first formed. The trees have had an annual dressing of about a quarter of a load of barnyard manure per tree until the year 1890, when the quantity was increased to about a third of a load. The trees, as a rule, have been regularly pruned, and the old ones are now, with scarcely an exception, fine specimens of the varieties which they represent.

The orchard has borne irregularly. What may be called the first crop was obtained in 1884. The yield was then large, possibly larger than the trees should have been allowed to bear, for, on an average, about 15 bushels per tree were harvested from the Kings. During the following years the crops were exceedingly light, but this year the orchard produced over three-fourths of a crop.

The orchard was sprayed for the first time in 1890. London purple was then applied at the rate of one pound to 200 gallons of water. The first application was made about the time the blossoms fell from the trees, and the second about two weeks later. In 1891, only one application was made to the orchard, London purple being used as before. The first experiments carried on under the direction of this station were made in 1892. The entire orchard was then treated with various fungicides and insecticides. Some of the results obtained indicated the lines of work followed during the present year.

*Apple Scab.*—The apple-scab fungus is probably the most serious enemy of the apple grower. It has been determined that this fungus is active even before the leaf buds open, and that the little apples are attacked as soon as the flowers open, and probably even earlier. We have still to learn at what season the growth of the fungus practically ceases, and during what period the apples and leaves are most liable to its attacks. This may be determined in two ways: First, by studying the

life history of the fungus, and second, by applying fungicides at intervals to the trees. If the last method is followed very thoroughly, the results may be obscured by the more or less complete extermination early in the season of the fungus in the treated orchard. But if a few thorough applications, made at the proper time, will prove to be sufficient to protect the trees, the fact that the trees are thus protected is of great practical value, whatever the natural life history of the fungus may be.

*Points of Merit in Fungicides.*—The relative merits of the most important fungicides now in use still require careful consideration. Cost, ease in preparing and applying, adhesive power, all must enter into any comparison which may be made; and of late a still more important factor has been added, namely, the readiness with which the fungicide may be applied in combination with the arsenites. The fungicide which surpasses in all the above points has still to be discovered, but some now in use possess most of them. Spraying need not be neglected from a want of effective material.

*Spraying Machinery.*—The machinery to use in orchard work is an important item. Spraying is hard work, unless the pump is run by horse power, and this can be used with profit only by owners of exceptionally large orchards. The vast majority of apple growers are necessarily forced to use hand pumps. These are now offered by the trade in almost endless variety, and selections are often difficult. Pumps of various descriptions have been tried at this station, and the following are some of the points which have been emphasized:

The pump should be powerful. It requires double the amount of exertion to apply a given amount of liquid with a small pump than is necessary when one of ample size is used. In general, a pump used for orchard work should have a cylinder at least  $2\frac{1}{2}$  inches in diameter, the stroke being from four to five inches in length. The handle should be long, as greater power can then be obtained. Working parts which are exposed to the action of the materials applied should be of brass, or else brass lined, for iron soon corrodes. The air chamber should be rather small, especially if the pressure of the liquid can be utilized in keeping the nozzle free from obstructions. In such cases, the one who pumps should be able to increase the pressure of the liquid in the nozzle by one or two quick strokes of the handle. A large air chamber defeats this. The pump used in the following experiment was the Gould "Standard" No. 2. It worked satisfactorily, but is open to the objection of being rather small, especially when much work has to be done.

Many pumps are supplied with agitators, but these have not proved so satisfactory as was hoped. It was found that those which stirred the liquid by means of a stream which was discharged from a return pipe near the bottom of the barrel did not keep the liquid in the entire barrel stirred, but only in that portion of it which came directly under the influence of the current. Another objection to this class of agitators is, that too much power is lost. Paddles of various kinds have been recommended. They are attached to the pump handle, and with each stroke pass through a certain portion of the liquid. These do better work than the agitators mentioned above, but they also require considerable power. No agitators were used in making the applications mentioned in the following pages. The liquids were stirred with a stick as often as was necessary, which was commonly before each tree was begun.

The improved McGowen nozzle No. 7 is the one used throughout the season. The spray thrown is fine and forcible, and the nozzle gave no trouble from clogging. The pump was fastened to a barrel which was turned upon its side. The barrel was then placed in a light wagon and filled through a hole about six inches square situated at one side of the pump. The liquid was directed into it by means of a wooden



funnel. Two persons worked together in making the applications; one drove and directed the spray, while the other pumped.

*Distance of Planting Apple Trees.*—The trees of this orchard are set 42 feet apart each way. The advisability of planting those varieties of apple which have spreading tops like King and Baldwin at least 40 feet apart cannot be too strongly emphasized. Sufficient room for the passage of a wagon must be allowed between the rows when the trees are full grown, and even 40 feet is not sufficient for some varieties. A closely-set orchard can be sprayed only with great difficulty, and an unsprayed orchard is rarely a profitable one unless it is situated in a peculiarly favorable locality, or unless it consists of varieties which are practically scab and worm proof. The greater ease with which an orchard may be sprayed when in full bearing is of itself a sufficient argument for open planting in apple orchards.

*Amount of Liquid Used.*—The amount of liquid applied to the large trees at each application averaged about four gallons. If less liquid was used it was found to be insufficient to cover all parts of the tree as thoroughly as was desired; when more was used, most of the excess fell from the tree to the ground and was lost. The number of trees which may be treated in a day with the outfit described above is about 125. In experimental work much time is necessarily lost, but this estimate is not far from the number of trees which may be well sprayed by regular work.

*The Weather.*—The spring and summer of the year 1893 were, on the whole, normal. The departure from the average rainfall of each month, in inches, was as follows: April, 1.69+; May, 2.01+; June, 1.57—; July, 1.20+. April and May show an increase, May particularly so. As the temperature during these months was practically normal, the apple-scab fungus met favorable conditions for its development. June was inclined to be dry, although considerable rain fell; but July shows a rainfall above the average. The work done the past season was consequently subjected to practically the same conditions which may be expected any year.

*Materials Used.*—The following are the materials applied to the orchard; they were used singly and also in combination:

- Bordeaux mixture.
- Ammoniacal copper carbonate.
- Paris green.
- London purple.

The Bordeaux mixture was prepared according to the formula:

- Copper sulphate, 6 pounds.
- Quicklime, 4 pounds.
- Water, 40 gallons.

The sulphate of copper was bought in the crystalline form. It was dissolved by placing the six pounds in a bag of coarse material and suspending it in the top of a pail filled with water. Treated in this manner, the crystals dissolve in an hour or two. If hot water is used, they enter into solution much more rapidly. The lime was generally slaked in about a pail of water. Then these two liquids were poured into a keg holding eight gallons, and a pailful of water was added. In this manner six gallons of concentrated Bordeaux mixture were obtained. If the entire amount was to be used, it was poured into a barrel holding 45 gallons, and sufficient water was added to make 40 gallons of the mixture. If only a small quantity of the Bordeaux was desired, it was made by taking one part of the concentrated mixture and adding to this nearly six parts of water. In this manner a mixture of very uniform strength was obtained. It was allowed to stand a few hours before using. When prepared according to the above formula, the cost of a gallon of Bordeaux mixture is about 1½ cents.

The ammoniacal carbonate of copper was made as follows:

Carbonate of copper, 5 ounces.  
Ammonia, 26°, 8 to 5 pints.  
Water, 40 gallons.

The amount of ammonia varied, for it could not be obtained of uniform strength; consequently the above formula was usually modified, and the fungicide was made by taking:

Carbonate of copper, 1 ounce.  
Ammonia, enough to dissolve the copper carbonate.  
Water, 9 gallons.

This formula has proved to be a very convenient one. Although the solution is a trifle weaker than the one first given, it is of the same strength as that recommended by the division of vegetable pathology, at Washington. The cost, when thus prepared, is about 1 cent per gallon. This fungicide was used during the entire season, in combination with Paris green. To 40 gallons of the ammoniacal copper carbonate of the strength given above there were added:

Paris green, 2½ ounces.  
Quicklime, ½ pound.

The lime was previously slaked in water, and then both ingredients were added to the copper solution immediately before the applications were made.

Paris green was used at the rate of 2½ ounces to 40 gallons of water, which is about the same as one pound to 256 gallons of water. London purple was used in the same proportions as the Paris green.

*Objects of the Experiments.*—The above materials were applied with the intention of observing the following points:

1. The number of applications of fungicides and insecticides necessary to produce fair fruit.
2. The comparative values of the fungicides.
3. The comparative values of the insecticides, and the advisability of applying them in combination with fungicides.

*Division of the Orchard and Dates of Applications.*—The orchard was divided so that some trees should be sprayed two times, others four times, and some even six times. Those sprayed twice received the first application May 19, and the second June 8. On the former date the first blossoms had just opened, only about a dozen being noticed, all upon King trees. At the time of the second treatment a few blossoms still persisted upon the trees. At first the intention was to have a shorter interval between the two applications, but the season advanced so slowly that it was thought advisable to wait. The trees which were sprayed four times were treated April 26, May 19, June 8, and June 22. When the first application was made, the buds upon the trees were swollen and almost ready to burst, but their winter covering still surrounded them more or less completely. In our experiments of last year the necessity for early applications was strongly indicated. On June 22, at the time of the fourth application, the young apples had set and active growth had begun.

The third lot, the one receiving six applications, was sprayed on the same dates as the preceding, but in addition the trees were sprayed July 13, and again August 1. In this manner the fruit and foliage were well protected during almost the entire season.

*Combinations Used.*—On June 8 and 22, following the fall of the blossoms from the trees, Paris green was also used in combination with the Bordeaux mixture. Otherwise the Bordeaux was used alone.

The ammoniacal carbonate of copper was invariably applied in combination with Paris green, according to the formula just given. Paris green readily dissolves

in ammonia, and it was hoped to avoid the caustic action of this solution by the addition of lime. Paris green was also applied alone to test its value as a fungicide.

*Grading of the Apples.*—The apples were harvested about the middle of September. The yield from each tree was placed in separate piles, so that it could be accurately examined and the effects of the various applications noted. The picked fruit was divided into three grades, the windfalls being so few in number that they were not taken into consideration. The standard for the first grade was high. It was the intention to have this grade composed entirely of fancy fruit, and only strictly first-class apples were put into it. The amount of scab or other fungous injury upon an apple determined its grade, the injury done by worms being rather secondary, for the apples were comparatively little damaged by them. As a rule, large and symmetrical apples possessing good color were placed among the seconds if several diseased spots could be found upon their surfaces, even if the spots were small, for such spots showed that fungi had succeeded in entering the apples, and this was just the result which the applications were designed to prevent.

Consequently the grading was not done entirely upon a commercial basis, for many of the apples which were counted as seconds might have entered the market as fancy fruit, because the injury done them was not great enough to cause any apparent disfigurement. The apples which constituted the third grade were extra specimens of cider apples, and they are so considered in table I, page 57, but they averaged as good as the ordinary barreling apples of the country.

In counting the number of apples which were wormy, some difficulty was at first experienced. All were not injured to the same extent by the larvæ of the Codlin Moth, these being the particular ones sought. When an apple had been attacked early in the season, the injury done could be seen at a glance. But young larvæ were abundant during late summer and early fall. Many of them had hardly begun their destructive careers; so that practically the apples were uninjured, although the cause for future injury was present. Such apples were, nevertheless, considered as wormy, and were graded second class.

For convenience in comparison, all the figures in the following pages show percentages. The first column, and the ones giving the weight of the fruit, are of course excepted.

The results from only three varieties are tabulated. Some of the other varieties contained in the orchard produced no fruit. Others, especially the Red Astrachan, could not be obtained to make comparisons, as the fruit was sold as soon as it was fit for market. In general, however, this variety gave nearly as marked results as those obtained from the Fall Pippin or the Maiden's Blush. A third reason for omitting certain varieties from the table is that no definite results were obtained. This subject is more fully treated under table II, page 57.

*Unsprayed Plots.*—Two King trees, situated in different parts of the orchard, were used as checks, in order to have a substantial basis with which to compare the results obtained from the sprayed trees of this variety. One-half of a Fall Pippin tree was used as a check, there being only four trees of this variety in the orchard. The orchard contains but one tree of Maiden's Blush, so that only one-half of this could be used as a check. However, from the appearance of other apples of these last two varieties, borne in the neighborhood, the fruit produced upon the unsprayed portions showed well the comparative value of untreated apples.

TABLE I—SHOWING RESULTS OBTAINED DURING THE SEASON.

NUMBER OF APPLICATIONS.	KING.													
	BORDEAUX MIXTURE AND PARIS GREEN.				AMMONIACAL COPPER CARBONATE AND PARIS GREEN.				PARIS GREEN.					
	Per cent.				Per cent.				Per cent.				Weight in lbs. of 100 apples.	
	1st class.	2d class.	3d class.	Wormy.	1st class.	2d class.	3d class.	Wormy.	1st class.	2d class.	3d class.	Wormy.	1st class.	2d class.
2.....	55	43	2	11	37½	45	52	3	9	47½	48	50	2	5
4.....	53	46	1	6	47½	50	46	4	7	44½	58	41	1	3
6.....	76	19	5	4	44½	57	37	6	5	49½	57	38	5	3
None.....	25	56	19	9	43	25	56	19	9	43	25	56	19	9

FALL PIPPIN.														
6.....	61	35	4	4	46	23	53	24	2	40	30	47	23	2
None.....	1	30	69	12	27	1	30	69	12	27	1	30	69	12

MAIDEN'S BLUSH.														
4.....	48	35	17	2	37½									
None.....	15	27	58	13	24½									

This table contains, in a condensed form, the principal results obtained this year in the orchard of Mr. McGowen, and it is the basis for many of the conclusions which follow. But additional tables are necessary in order to realize the full force of many of the figures, and to compare in a more convenient form various results obtained.

*Number of Applications Necessary.*—To reply to the question, How many applications can be applied with profit? is not an easy task. Too many factors must be taken into consideration to give an answer which will apply to all apple growers. It can be shown what the results of varying numbers of treatments have been, and from this each grower must decide for himself how many can be made with profit. The percentages of gain in first-class apples of the sprayed over the unsprayed portions are given below:

TABLE II—SHOWING PERCENTAGES OF GAIN IN FIRST-CLASS APPLES OBTAINED FROM VARYING NUMBERS OF APPLICATIONS.

NUMBER OF APPLICATIONS.	KING.				FALL PIPPIN.				MAID-EN'S BLUSH.	General average gain.
	Bordeaux mixture....	Am. carb. copper....	Paris green..	Average....	Bordeaux mixture....	Am. carb. copper....	Paris green..	Average....	Bordeaux mixture....	
2.....	120	80	92	97	.....	.....	.....	.....	.....	97
4.....	112	100	132	115	.....	.....	.....	.....	220	141
6.....	204	128	128	186½	6000	2200	2900	3700	.....	1926½

This table emphasizes several facts. In the first place, it shows what an enormous range of variations is found in the treated apples of different varieties. The series is most nearly complete in the King, but the Fall Pippin shows the benefits of six applications, and the Maiden's Blush of four. The last was more affected by

four applications than the King by six, and undoubtedly the Fall Pippin would have shown a still greater difference, judging from the effect produced by six applications.

Turning to the King, it will be seen that on the average two applications increased the number of first-class apples 92 per cent., four applications 115 per cent., and six applications 150 per cent. In making these averages, only the application of Bordeaux mixture, ammoniacal copper carbonate and Paris green were considered, for it would be obviously unfair to include fostite under the six applications and not under the others. This fungicide was applied merely for the purpose of determining its value as compared with the others.

It is practically impossible to show by means of figures the exact condition of an apple crop. The averages for the King, and these were the ones particularly selected to determine the benefits derived from different number of applications, show a uniform and marked increase in the number of first-class apples as the number of applications increased. As has already been said, the grading was not done for the ordinary market, but for fancy trade, and, since the later applications protected the fruit from attacks of scab which would have produced but slight blemishes, the above figures must not be construed to show that it is much better for the general grower to make six applications instead of four.

The commercial grading of all the Kings, as made by the buyer, was as follows: The total yield of Kings was 65 barrels. Of these, 59 barrels were marked as firsts,  $4\frac{1}{2}$  as seconds, and  $1\frac{1}{2}$  barrels as thirds. On considering the percentage of the three grades, they constituted respectively 91, 7 and 2 per cent. of the total yield. In this grading, the windfalls were also included, which was not the case in table I, page 57. The highest per cent. of first-class fruit shown by this table was 76, yielded by King apples sprayed six times with the Bordeaux mixture. Some idea of the high standard set may be obtained by comparing this with 91 per cent. made in packing.

*Value of Sprays upon Different Varieties.*—Two important factors must be considered in spraying every orchard. The first and more important one has to do with the varieties grown; the second has reference to the characters of the season. During wet weather more applications are necessary than when the rainfall is slight. Dry seasons do not favor the development of injurious fungi, and the materials applied remain upon the trees much longer, not being washed off by rains.

Some varieties are undoubtedly much more subject to the attacks of apple scab than others. The past season proved this beyond a doubt, as regards the varieties grown in the treated orchard. Several trees of Baldwin and Fallawater were included in the experiments, but no detailed report is here made of the results obtained, as there was practically no difference between treated and untreated trees. Although the Fall Pippin and the Maiden's Blush apples were nearly ruined when not treated, Baldwin and Fallawater apples growing close by them were hardly injured. I believe it can safely be said that the susceptible varieties mentioned above could have been sprayed with profit four or five times, in order to reduce insect and fungous injury, while the comparatively resistant varieties would not have repaid any more applications than those necessary to control the Codlin Moth, two treatments with Paris green being probably sufficient for this purpose.

Another point bearing upon this subject cannot be overlooked. Many varieties are not uniformly attacked in different localities. It may pay some growers of a certain apple to spray it thoroughly, while the same variety in another locality would not warrant the expense of even one treatment for scab. During the summer of 1892, an attempt was made to determine the amount of injury done by the scab to the varieties of apples now in cultivation. The results of the work were

published in bulletin No. 48 of this station. Although the list given is not so complete as might be wished, it is still of interest in this connection.

From the preceding, it will be seen that no rule regarding the number of applications, nor the dates upon which they are to be made, can be laid down with safety. Each grower must be his own judge. If two, four or six applications are decided upon, they can be applied with safety and profit, in New York, upon dates given on page 55, subject to the condition of the season.

*Comparative Efficacy of the Fungicides.*—A fair idea of the comparative values of the various fungicides used can be obtained by examining the number of first-class apples produced by the trees sprayed six times with the fungicide used in each plat.

TABLE III—SHOWING THE PER CENT. OF FIRST-CLASS APPLES PRODUCED IN THE DIFFERENT PLATS.

TREATMENT.	PER CENT. OF FIRST-CLASS APPLES OF EACH VARIETY.			PER CENT. INCREASE OF EACH VARIETY.		
	King.	Fall Pippin.	Maiden's Blush.	King.	Fall Pippin.	Maiden's Blush.
Unsprayed.....	25	1	15	.....	.....	.....
Bordeaux.....	76	61	48	204	6000	2200
Ammoniacal carbonate copper.....	57	23	.....	128	2200	.....
Paris green.....	57	30	.....	128	2900	.....

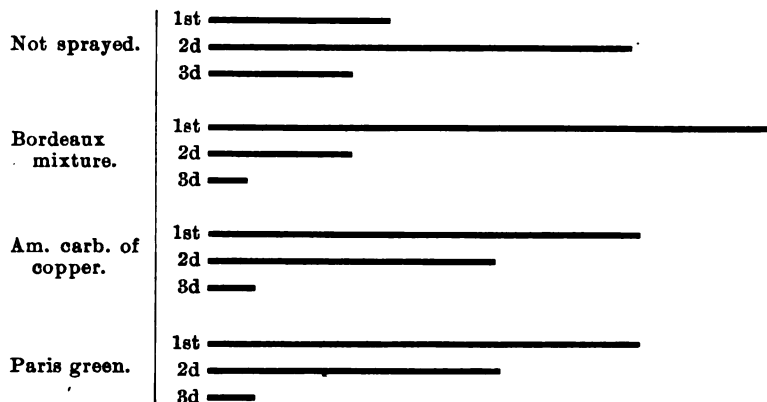
The decided superiority of the Bordeaux mixture can be seen at a glance. In no case did any other fungicide give results which approached in excellence those obtained from this mixture. Nor is its value fully shown by the number of apples in the various grades, for the general appearance of these apples was so superior that the fruit of the Bordeaux lots could be identified at sight almost with certainty. This superior appearance was mainly due to the uniform size of the apples, their regular form, and the smoothness of the skin. Fig. 6 illustrates these points well. The regularity with which the first-class apples could be piled upon the trays is particularly to be noticed. Little remains to be desired as regards uniformity of fruit.

The general effect of six applications upon King and Fall Pippin apples may be obtained by comparing Figs. 6 and 8, these representing treated apples, with Figs. 7 and 9, showing fruit which was not sprayed. With the more susceptible varieties, it is evidently a question of crop or no crop, and the answer is in the hands of the grower. In comparing the illustrations, it must be borne in mind that among the sprayed lots were a great many apples graded as seconds which really were first-class apples, only they did not bear the test of sufficient freedom from scab. The general appearance of the seconds of the unsprayed lots was markedly inferior to the same grade of the sprayed lots.

The ammoniacal carbonate of copper most nearly approached the Bordeaux mixture in the value of the results obtained. Although the average increase of first-class apples, 128 per cent., is the same as that given by Paris green, still the general appearance of the apples treated by Paris green and carbonate was plainly in favor of those treated with the ammoniacal solution. The first-class apples of this last were almost equal to the same grade of those treated with Bordeaux, while those treated with Paris green were not. More small spots of scab could be found upon the latter, and the apples were unquestionably inferior. However, in the general market most of them would have been classed as firsts.

The following diagram will assist in showing more plainly the results obtained from four applications of various fungicides upon King and Fall Pippin apples:

DIAGRAM I—SHOWING THE RELATIVE VALUES OF THE FUNGICIDES APPLIED TO KING APPLES.



None of the apples showed the effects of spraying more plainly than the Fall Pippin. This variety is very subject to the attacks of scab, and showed clearly the comparative values of the fungicides, as well as the benefits derived from proper applications. The unsprayed Fall Pippin yielded scarcely a first-class apple, the bulk of the crop being third class. The apples treated with Bordeaux were mostly first-class apples, while the proportion of thirds is exceedingly small. Certainly it pays to spray this variety.

*Insecticidal Values of the Arsenites.*—Although the London purple and the Paris green used in these experiments contain about the same amounts of arsenic, still it is held in different forms. Applications were made to determine their comparative values.

TABLE IV—SHOWING THE RESULTS OBTAINED FROM APPLICATIONS OF THE ARSENITES.

	King.				Fall Pippin.			Maiden's Blush.	
Number of treatments.....	1	2	6	0	2	6	0	2	0
Materials applied.	Per cent. of wormy fruit.								
Bordeaux mixture.....	11	5	.....	9	4	.....	12	2	13
Am. carb. copper.....	9	7	5	9	.....	2	12	.....	.....
Paris green.....	5	6	3	9	3	2	12	.....	.....
London purple.....	.....	3	.....	9	.....	.....	.....	.....	.....

The apples were on the whole very free from worms, whether sprayed or not, yet the above table indicates some of the effects of the applications.

The per cent. of wormy apples among those sprayed but once with Bordeaux is large when compared with the apples which were not sprayed. In one case the number is larger, but, on the average, a small gain was made. This application was made June 8, as soon as the blossoms had fallen from the trees.

All varieties show a considerable decrease in the number of wormy apples when the trees were treated twice. The second application was made June 22, two weeks after the first. These two treatments protected the apples so well that any additional ones would hardly have been profitable. June was comparatively dry (see page 54), but the rainfall during July was considerably above the average, so that



**FIG. 6.—** King, sprayed six times with Bordeaux mixture. First lot, to the left, are No. 1; second lot, to right, No. 2; third lot, No. 3, or culls for cider.



**FIG. 7.—** King, not sprayed. First lot, No. 1; second lot, No. 2; third lot, No. 3, or culls for cider.



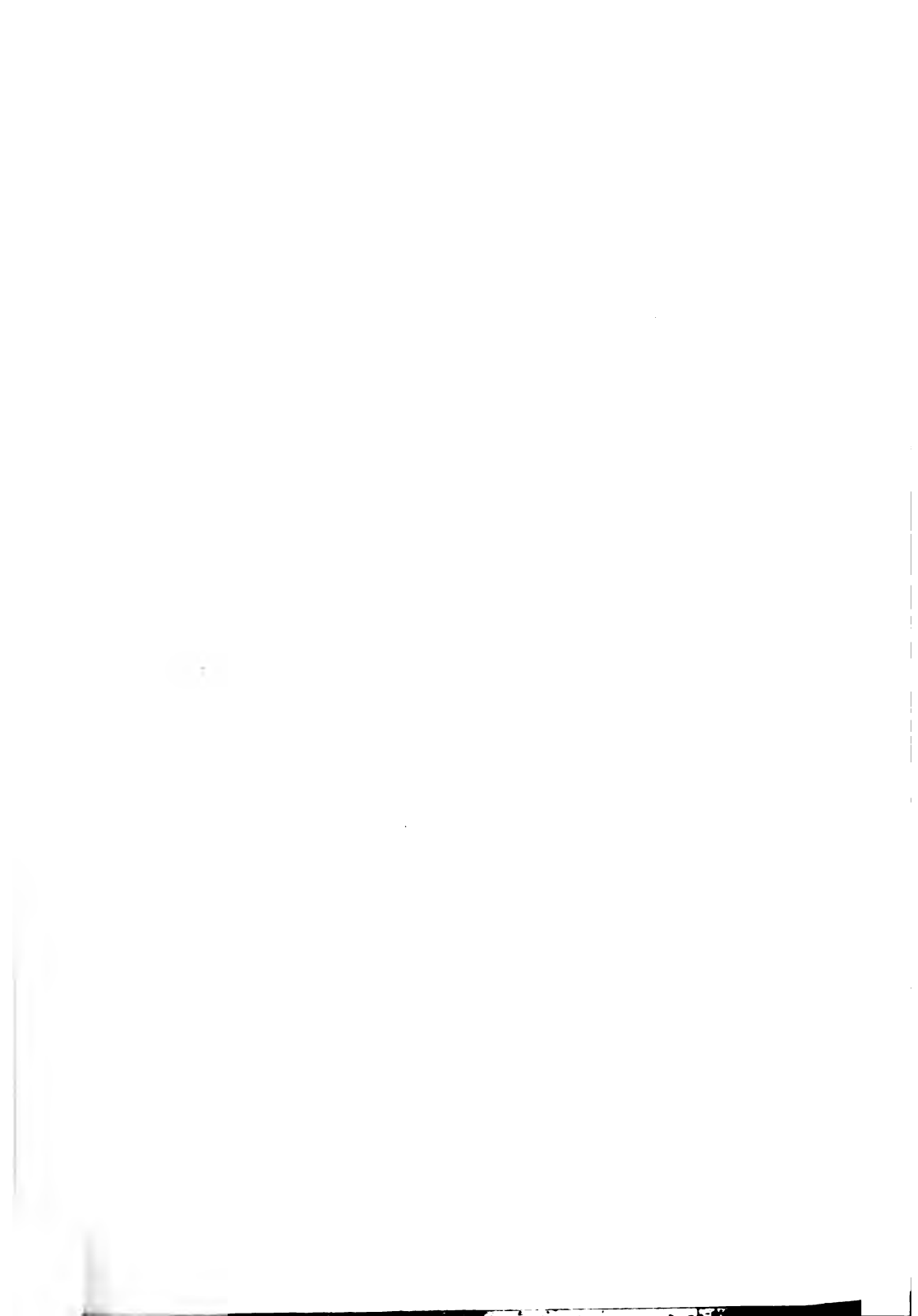




FIG. 8.—Fall Pippin, sprayed six times with Bordeaux mixture. First lot, No. 1; second lot, No. 2; third lot, No. 3, or culls for cider.



FIG. 9.—Fall Pippin, not sprayed. First lot, No. 1; second lot, No. 2; third lot, No. 3, or culls for cider.



the poison stood a good chance of being washed from the trees. It would scarcely seem to be advisable to apply Paris green or London purple more than twice in a season for the Codlin Moth, unless the rainfall is very heavy or continuous. Late applications protect the fruit from larvæ which hatch late in the season, but their numbers are comparatively few, and the damage done is so insignificant from a financial standpoint that the returns will scarcely warrant the expense.

On the whole, it appears to be immaterial in which form or combination the arsenites are applied. The table shows that, when only one application was made, Paris green gave better results when applied alone than when applied in combination with Bordeaux. But when two applications were made, this result is reversed. This coincides practically with the results obtained in 1892, when it was also found that the action of the poison was not materially affected by the presence of the Bordeaux mixture.

Paris green and the ammoniacal solution did not give such favorable results, but as the difference is comparatively slight, conclusions adverse to the combination can scarcely be drawn.

Two applications of London purple made upon the King gave more sound apples than two of Paris green, only 3 per cent. being found wormy. But Paris green equals this in two applications made upon Fall Pippin, and surpasses it by 1 per cent. in the Maiden's Blush. Consequently, no preference can be given to either poison as regards its insecticidal value. It is probable that, if each contains the same amount of arsenic, the value of the two is the same. In one respect, however, Paris green has been disappointing. It was found last year, and again this summer, that the foliage of apple trees is more or less injured by its use. When many applications are made, using one pound of the poison to 256 gallons of water, the injury may become serious. After the fourth application had been made to the orchard, it was found advisable to use about a quarter of a pound of quicklime, first slaked in water, to every 40 gallons of the poison mixture. This apparently stopped the caustic action of the Paris green. Samples of Paris green from several manufacturers are now being analyzed by the station chemist, and from incomplete data it would seem that all Paris green now sold in the market contains more or less soluble arsenic. If trouble is experienced in its use, the addition of lime will be sufficient protection to the foliage. London purple also injured the foliage, even to a greater extent than did the Paris green, but the injury was partially obscured by the action of fostite, which was applied upon the same trees.

The ammoniacal carbonate of copper to which was regularly added Paris green and lime, as described on page 55, proved very satisfactory as regards injury to foliage. Throughout the season the leaves of trees treated with this combination were healthy, and the trees looked vigorous. The Bordeaux mixture also protected the foliage so well that scarcely a diseased leaf could be found. This effect was particularly noticeable on the Fall Pippin. The difference in foliage between the sprayed and unsprayed trees could be seen very plainly. The foliage of this variety is naturally much attacked by the apple-scab fungus, and this characteristic allowed the beneficial action of the fungicide to become apparent. The foliage of a Fall Pippin tree that was sprayed with Paris green was also noticeably more healthy than the unsprayed.

*Size and Color of the Sprayed Fruit.*—The size of the apples was in some cases very plainly affected by the applications, and possibly also the color. On this latter point there was a difference of opinion, just before the apples were picked. The apples were sold while still upon the trees, and the buyer very soon discovered an unsprayed tree and wanted to know what was the matter with it. It was his opin-

ion that the color of the sprayed fruit was deeper and brighter, and others affirmed the same, but the point is open to doubt. Many varieties of apples will color beautifully, if the sun is allowed to shine upon them, even after they are picked.

But there can be no question of increased size of the sprayed apples. The Kings did not show it so plainly, from the fact that the entire trees received the same treatment. By referring to table I, page 57, it will be noticed that the weight of 100 apples sprayed twice with Bordeaux mixture was 37½ pounds; sprayed four times, 47½ pounds; sprayed six times, 44½ pounds. There is apparently no connection between the weight of the fruit and the treatment of the trees, and the other weights given under this variety are equally disconnected. An accurate comparison can be made in case of the Pippins. In the table mentioned, the numbers in the division which refers to the portion treated with fostite and Paris green were obtained from trees treated only upon one side, the other half remaining as a check. The gain in weight is shown to be 3½ pounds, although the treated apples were by no means the best. But the Maiden's Blush apples showed what could be done. There is only one tree of this variety in the orchard, and this year it bore a fair crop. One-half of this tree was sprayed with Bordeaux and the other half was not touched. When harvested, 100 average apples of the unsprayed side weighed 24½ pounds, while an equal number similarly chosen from the other half of the tree weighed 37½ pounds; a gain of over 54 per cent. This difference was forcibly shown in another way; in fact, so plainly and conclusively did it show the value of spraying apples susceptible to the attacks of the scab that it alone would convince the most skeptical that the operation is a paying one. One hundred average unsprayed apples filled a half-bushel basket evenly full; 100 of the average sprayed apples filled a bushel basket evenly full. Thus the bulk of the crop of Maiden's Blush was practically doubled. At the same time the energy of the trees was taxed but little more, as the production of the seed in the apple is more exhaustive than the production of the flesh. It is true that but few commercial varieties of apples will respond so generously to treatment, but still some will, and there can be no doubt that all varieties attacked by fungus are more or less checked in their growth. In addition to this, healthy foliage assists in making a healthy and vigorous tree, resulting in the defection of a greater amount of food to the fruit.

*Keeping Qualities of Apples as Affected by Sprays.*—A few Fall Pippin and Maiden's Blush apples were selected from the sprayed and also from the unsprayed portion of the trees, about September 20. Bordeaux mixture had been used upon the former. They were stored in a cool, dry cellar. On the 15th of October the unsprayed apples began to show signs of shriveling. The scabby portions were depressed, and some days later showed signs of decay. November 18, the unsprayed apples were much shriveled and somewhat decayed. The sprayed apples, which were exceptionally fine specimens, were still plump and fit for market. It is possible that the keeping qualities of apples may be considerably affected by proper applications.

It will undoubtedly be interesting to follow the apples from this orchard into the markets, and thus determine what relation the spraying of the fruit bore to the price received for it. Through the kindness of the buyer, J. H. Gail, commission merchant, in Buffalo, N. Y., I am able to give his report on this point. His statement regarding the appearance of the fruit in the orchard was as follows:

"Without question, the showing of the fruit, before harvesting, in the apple orchard of John J. McGowen was one of the finest it has ever been my pleasure to see. The fruit, having been picked and barreled for extra-fancy trade, did not show over 2 or 3 per cent. of culls; and the culled fruit, when packed, made a very good grade of second quality. There was practically no fruit usually known as cider apples in the orchard."

FUNGICID.

The following letter relates to the sale of the apples in Buffalo:

The apples were as fine as anything I ever saw in the shape of Kings, even those rated as seconds, or No. 2's, being as good as the ordinary run of No. 1 fruit; in fact, they sold at the price of other No. 1's. We commenced the trade on them as soon as they arrived here, to some of our buyers of fancy fruit, at \$4.50 per barrel, in job lots. I think had we put the price at \$5 we should have got it; in fact, we did get it for a portion of them, while the ordinary run of Kings and so-called No. 1's sold in single-barrel lots at the same time at \$3.75 to \$4. We think they went out fully \$1 per barrel better than the average run of Kings, and all who had them were anxious for more.

J. H. GAIL.

BUFFALO, N. Y., November 14, 1893.

The following letters indicate the attitude of leading fruit growers of this state regarding the spraying of orchards:

In my opinion, spraying is a work of inestimable value; indeed, I believe no man engaged in growing apples can afford to dispense with it. He should spray both with reference to the work of insect life and fungi. It should be done at least twice in the season, and *every year*. The operation is inexpensive, and will pay a larger percentage on the investment than any other outlay of an equal amount.

S. D. WILLARD, Geneva, N. Y.

After five years' experience in spraying with insecticides and fungicides, I am sufficiently satisfied to plan for the future to do the work more thoroughly than it has yet been done.

I have found that Paris green not only avoids a large per cent. of the Codlin Moth's depredation, but it also has the effect of destroying the tent caterpillars and other leaf-eating insects that destroy much of the foliage during the period when it is most needed to perfect the development of wood and buds for the following year, as well as the fruit of the present.

There is no doubt but that much of the failure of the orchards of New York for the past 10 years has been due to insects that have annually denuded the trees of a large amount of foliage, and there has been a formation of fruit buds of low vitality.

The same effect has been produced by a steady increase in attacks of apple-scab fungus upon both fruit and foliage, which the trees have not been able to resist, and I have seen fruit over entire counties in western New York fall to the ground, within a week after blooming, from the effects of apple-scab fungus; and the young foliage was as sear as if a frost had injured it.

When using Paris green alone, I apply one pound to 250 gallons of water. If used with Bordeaux mixture, one pound to 200 gallons.

A very thorough, even distribution of the mixture is more essential than quantity.

I have used 4 pounds of copper sulphate and 3 pounds of lime to 50 gallons of water with satisfactory results on apple, and particularly so on quince, the past season, as also with grapes. These were sprayed three times, with 12 and 15 days intervening. The fruit was clear in color and improved in quality.

No fixed time can be set for the spraying. The fruit grower must study the conditions, which vary with each season.

Some varieties are more susceptible to fungus attack than others, as the Spitzenberg and Cranberry Pippin among apples, and the White Doyenne and Flemish Beauty among pears, and these require more thorough treatment than others.

GEO. T. POWELL, Ghent, N. Y.

I made one experiment in which about one-sixth of a Rhode Island Greening tree was sprayed with Paris green, using one pound of the poison to 200 gallons of water. As no rain fell soon after this application, a second one was not deemed necessary. When the apples were harvested, the sprayed portion yielded 534 sound apples, or 4 bushels, and 48 wormy apples, or about one-fourth bushel. The unsprayed portion yielded 216 sound apples, or 1½ bushels, and 92 wormy apples, or three-fourths bushel. Many wormy apples fell from the unsprayed portion during the season, and as this was not the case with the part sprayed, the above figures are very partial to the side that was not sprayed. The sprayed apples were larger, of better color, and showed less scab. The man who came to buy my crop saw the sprayed side of the tree first, and actually gave me 5 cents a barrel extra for *all* my fruit, although most of my orchard consists of green instead of red varieties.

C. E. CHAPMAN, Peruville, N. Y.

## TEST OF SOME FUNGICIDES AND INSECTICIDES UPON PEACH FOLIAGE.

BY PROF. E. G. LODEMAN, IN BULLETIN NO. 60, EXPERIMENT STATION, ITHACA, N. Y.

Peach trees were treated with the following materials, for the purpose of determining the extent to which each would injure the foliage:

*Bordeaux Mixture*.—This was prepared according to the formula given on page 54.

*Bordeaux Mixture and London Purple.*—The arsenite was used at the rate of one pound to 250 gallons of the mixture.

Ammoniacal carbonate of copper, prepared as described on page 55.

Ammoniacal carbonate of copper, Paris green, and lime. These materials were used in the proportions stated on page 55.

Paris green, used alone, at the rate of one pound to 250 gallons of water.

London purple, used at the rate of one pound to 300 gallons of water.

The above materials were applied to the trees three times, and upon the following dates: July 18, August 3, and August 22. The ingredients of the combined insecticides and fungicides were mixed immediately before the applications were made. The table shows the extent of injury resulting from each.

KIND OF TREATMENT AFTER THREE APPLICATIONS HAD BEEN MADE.

VARIETY TREATED.	TREATMENT, AND PER CENT. OF LEAVES DROPPED.					
	<i>Bordeaux mixture.</i>	<i>Bordeaux and London purple.</i>	<i>Ammoniacal carbonate of copper.</i>	<i>Ammoniacal carbonate of copper and Paris green.</i>	<i>Paris green.</i>	<i>London purple.</i>
Old Mixon.....	0	0	75			
Crawford.....				10	75	90

The above notes were taken September 12, or 21 days after the last application had been made. Notes were also taken August 22, or after only two treatments had been made.

The Bordeaux mixture did not injure the foliage, whether London purple was added or not. As above prepared, it is a perfectly safe fungicide to use on peach trees, and the addition of London purple does not render it caustic.

The ammoniacal copper carbonate, when used alone, seriously injured the foliage after three applications had been made; fully 75 per cent. of the leaves dropped from the trees, and the remainder showed injury, more or less serious.

When Paris green and lime were added to the ammoniacal solution, two applications showed considerable injury to the foliage. Three applications caused from 5 to 10 per cent. of the leaves to fall; about 10 per cent. of them were yellow, but the remainder showed comparatively little injury. Possibly this decrease in the extent of injury may, in part, be due to the variety treated, but it is scarcely probable that this influence was very great.

The action of Paris green was exceedingly caustic. Two applications caused nearly a fourth of the leaves to drop from the trees, while soon after the third application about 75 per cent. fell to the ground. It is unsafe to use Paris green upon peaches, unless the mixture be made very weak.

London purple did still more damage than Paris green. Fully 90 per cent. of the leaves dropped from the tree after the third application. This result coincides with those previously obtained by various experimenters, particularly those published from this station in 1890.

SUMMARY.

1. Pumps used in spraying orchards must have a large capacity, in order to be economical of labor.
2. Automatic agitators have not given satisfactory results.
3. That spraying may be facilitated, the trees in an orchard should be planted far enough apart to allow of the passage of a wagon when the orchard is in full bearing.

4. The amount of liquid required to spray a full-grown apple tree is about four gallons.

5. The number of applications necessary to protect apples from the scab fungus cannot be definitely stated. As a rule, it may be said that a fungicide should be applied at least once before the trees blossom, and two applications are necessary after the falling of the blossoms upon those varieties which are habitually injured by scab to any serious extent. Upon many susceptible varieties one or two additional treatments are advisable. Only one or two applications may be applied with profit to resistant varieties.

6. The advisability of making more than one or two applications of fungicide to Baldwin and Fallawater apples is doubtful. King, Maiden's Blush and Fall Pippin apples will repay four and possibly six applications. Red Astrachan can also be profitably treated three times.

7. Bordeaux mixture proved to be by far the most effective fungicide of those used. Following the Bordeaux, in the order of their value, are the ammoniacal solution of copper carbonate, Paris green.

8. No preference can be given Paris green or London purple in regard to their insecticidal value, provided they contain an equal amount of arsenic.

9. Two applications of the arsenites are sufficient to control the ravages of the first brood of Codlin-Moth larvæ. The financial gain derived from later application may be doubtful.

10. The arsenites and the fungicides used in the apple orchard appear to be equally effective whether applied alone or in combination.

11. Paris green and London purple, if applied more than once or twice to foliage, may do serious damage unless their caustic action is neutralized.

12. Lime greatly reduced the caustic action of Paris green.

13. The foliage of varieties of apples susceptible to the attacks of apple scab was kept in a healthy condition by applications of fungicides.

14. The size of Fall Pippin apples was practically doubled by protecting them from the attacks of the apple-scab fungus.

15. The use of fungicides may intensify the color of apples.

16. The keeping qualities of Fall Pippin and Maiden's Blush apples were apparently greatly augmented by the applications of Bordeaux mixture which were made to reduce injury from scab.

17. The market value of sprayed apples was increased at least \$1 per barrel by the applications made during this season.

18. Bordeaux mixture, when applied to peach trees alone, or in combination with London purple, did not injure the foliage.

19. The ammoniacal carbonate of copper is very injurious to peach foliage, but the solution may be rendered less caustic by adding lime. The addition of Paris green can then also be made with comparative safety.

20. Neither Paris green nor London purple should be used upon peach trees unless the mixtures are very dilute, or lime is added to neutralize the caustic action of the arsenites.

21. The Bordeaux mixture, when properly applied, practically protects the foliage of apples, quinces, dewberries, raspberries, blackberries and gooseberries from fungous attack.

22. On the whole, therefore, I recommend that growers adhere to Bordeaux mixture in combating fungi; or ammoniacal carbonate of copper may be used as a second choice, in case the Bordeaux cannot be applied with facility. Paris green and London purple are still the best general insecticides, and the greater value seems, in general, to reside in Paris green.



## FRUIT-TREE BLIGHT IN GENERAL.

BY PROF. J. M. STEDMAN, AGRICULTURAL EXPERIMENT STATION, AUBURN, ALA.

Blight is a disease of plants that has of recent years attracted considerable attention, especially from the fruit grower, due to the fact that certain kinds of fruit trees have become affected with this disease, which has spread each year, doing increasing harm. With the rapid yearly increase in the number of fruit trees affected, together with the equally rapid increase in the geographical area of distribution of the disease, has come a widespread interest in this subject throughout the whole country; and this subject is attracting attention more and more, and it has so increased that it is now not confined to the fruit grower, but the farmer and even the general public have come to recognize this disease as a most serious one. The fact that its exact nature is not generally known, and the remedy perhaps even less, has helped to increase the dread of it and to allow many to neglect their trees and permit them to die in consequence. Hundreds of instances have come under my observation in this state where village people with a few fruit trees, as well as farmers and even fruit growers, allow their trees to go unattended to when the disease appears, and the disease to increase and kill the trees and spread to others unaffected. So great has been this sad neglect of trying to check this disease, due no doubt to a want of information, together with the great yearly financial loss due to it, that this bulletin has been written, with the sole purpose of giving to the public, and to the fruit growers and farmers of this state in particular, a general knowledge of what is at the present time known to biologists in regard to the nature and cause of the disease and of the remedies to be used to combat it and to prevent its spreading to unaffected trees and areas.

The blight is at present more common in the northern part of the state. A fruit grower from that locality, who depends almost exclusively upon his fruit trees for a living, states that his apple trees are so badly affected with blight that he has lost nearly his entire crop and a large percentage of the trees. One can readily see what the disease *blight* means to such a citizen. While attending farmers' institutes in various parts of the state this past summer, I had a good opportunity to observe the effect and extent of this blight; and it was sickening to note the great amount of damage and loss by it, not only of this year's crop, but of the trees themselves; and what is still more, to note the neglect, which must result in the great increase and spread of the disease next year. It is to be hoped that all who read this bulletin will take every precaution themselves and inform their neighbors on this subject, and let all work together to greatly lessen, if not annihilate this, the worst of all plant diseases.

The different kinds of plants that are subject to the attack of the disease *blight* is very great; and it is by no means confined to fruit trees, but even shade and forest trees are subject to it. In some localities in the northern part of this state, I have observed the oak trees affected to such an extent that, with certain species, it was almost impossible to find one perfectly healthy, and, as a rule, the entire tree was more or less diseased. Fortunately this seems at present to be confined to a few localities only, but one of these is at least five miles in diameter. Should this blight increase, as it seems certain to do, we may in a few years have an even greater problem to contend with than that of our fruit trees.

The blight appears in many cases soon after the trees are leaved out, but more often later, and may appear at any time during the summer. Its growth ceases in the fall, at about the time the leaves begin to dry and turn preparatory to shedding, or at the approach of cool weather. The blight makes itself manifest by causing

the affected parts, both leaves and stems, and it may be also the fruit, to turn a brown color, which varies from a light brown to a dark, tobacco brown, or in some cases an almost black appearance. This coloration of the leaves due to the blight is readily distinguished from the coloration of the leaves due to any other cause, as the partial or total breaking of a stem, or the girdling of the trunk or stems, or an injury of the roots. In the case of coloration by blight, the leaves do not appear dried or shriveled, as a rule, except in the case of the water oak, but preserve their proper shape; whereas, in the coloration due to other causes, the leaves appear dried and shriveled, and have a lighter brown color. Moreover, the coloration due to blight may not at the time being affect the entire leaf, but may appear on any portion of the leaf, or in several places, and cause it to be spotted. Ultimately, however, the entire leaf will become affected, unless the growth of the disease be checked by some cause. The disease appears first, as a rule, at the buds or growing tips of stems or young leaves where the tissues are tender, and from these places it spreads down the stem, involving ultimately all the branches and leaves of the affected limb, together with its fruit. As a rule, a tree is attacked in several places at once; it may be on many different limbs or on several twigs of the same limb, or both, and when a tree is attacked in a great many localities, involving a large number of limbs, and this early in the season, the disease will often so increase as to involve the entire tree above the roots, and kill it in one summer if unattended to. It is not an uncommon occurrence, when such a tree has been cut down close to the ground soon after it died, to have new shoots appear from the old roots and grow to be good bearing trees.

Blight always kills the parts of the plant affected. Although the term *blight* is restricted in its true sense to this particular disease of the leaves and stems, with their fruit, which is often itself affected, due to a spreading of the disease to it from the stem, nevertheless, there are diseases of the fruit itself that do not involve other parts of the tree, which diseases are the result of a cause, the nature of which is like the cause of true blight. When the fruit alone is affected with a *blight* that does not spread to other parts of the plant, we call this disease *rot*, as a rule, although the term *rot* is also applied to diseases of the fruit the cause of which is entirely different from that of true blight. There are cases, however, where true blight may begin in the fruit, or even blossom before the fruit is formed, and from it spread to the stem and leaves. In this case, Waite has demonstrated that insects are the active agents in carrying the disease from one place to another; and that they inoculate the flowers which may have produced minute fruit before the disease increased so as to kill it and spread to the twig, or the disease may have increased so as to prevent the least formation of fruit.

#### THE NATURE AND CAUSE OF BLIGHT.

The disease known as *blight* is caused by bacteria. Bacteria are plants that are so small that in some cases 25,000 of them placed side by side would extend but one inch. Most bacteria, however, are a little larger than this, while many are smaller. They are as a group the smallest of living things, but what they lack in size they make up in numbers. Their power of multiplication is so great that in many cases, where everything is favorable as regards food and temperature, the result of the growth and multiplication of a single individual plant would be many thousand in one day.

Each plant, or bacterium, consists of nothing more than a single cell, or, to make it more plain to the cultivator, of a single minute sack or mass of living matter. The rapid multiplication of these organisms takes place by a simple division of this single cell into two usually equal parts, each one now constituting a new and in-

dependent plant, which repeats the same process of division after a little growth. Bacteria also have another mode of reproduction, by what are called spores. These spores are, as a rule, much smaller than the adult bacteria, and are capable of withstanding greater hardships and live. The adult bacteria themselves can withstand in many cases prolonged drying and a very high or low temperature, but the spores can withstand much more. The spores of many species or kinds of bacteria will withstand boiling for an hour, or even more, and some at an even higher temperature, while the spores of *Bacterium anthracis* are stated by Pasteur to remain alive in absolute alcohol.\* The spores will also withstand the action of many fungicides and insecticides. This will give the reader some idea of the great vitality of these micro-organisms, and enable one to understand why these creatures can live in the soil, not only during the dry and hot summer weather but also during the cold of winter. Their minute size will also enable one to readily see how it is that they can float about in the air in great numbers and be carried from one place to another.

Many bacteria are harmless, since they feed upon only dead or not living tissues or organic substances, and some are even beneficial; but many are injurious, since they feed upon and live within other living organisms, both plant and animal, and in this case may produce disease and death. This death or disease may be the result of the direct action of the bacteria in consuming the tissues, or it may be as a result of the chemical action of the waste products (ptomaines) thrown off during the growth and metabolism of the bacteria. Hence it is observed that there are many species or kinds of bacteria; and they not only act differently and produce different results and diseases, but each species, as a rule, has its particular animal or plant or substance in which it will grow and multiply, and will not do so in any other.

The bacteria that cause the disease in fruit trees known as *blight* are carried by the wind, or by insects in some cases, from the soil to the buds or leaves of the trees. Here they gain access to the interior of the leaves by means of the stomata or minute openings in the epidermis of the leaf, of which there are in some cases many thousand to a square inch. Once on the tender buds or inside the leaves, the bacteria find suitable food and conditions for their growth and multiplication. They feed upon the tissues of the host plant and destroy it, and as they increase in number they gradually come to infest the entire leaf, and finally the petiole and the twig, to the stem and other healthy parts. In this way the disease once started in a single place in the tree will spread so as to include in time the entire limb, or even the entire tree. The disease works down towards the trunk of the tree as well as in all other directions, and, since the tissues affected soon die, it follows that if the blight start low down on a branch it will necessarily kill the entire branch beyond the diseased portion.

The peculiar coloration of the blighted portion does not in reality indicate the entire area affected, since the bacteria are in many cases, especially in the stem, far below or down the branch before the coloration appears there, the coloration not being produced immediately upon the appearance of a few bacteria. Hence, in cutting off of a diseased limb it is not sufficient to cut off the portion showing the coloration, since we would leave the stump affected with the bacteria for a considerable distance, and these would continue to multiply and spread, and shortly the disease would again make itself manifest. It is essential then in cutting off the blighted portion of a tree to cut far below the portion that looks diseased, say from one to three feet, according to the size of the limb. It is also safer to cut off the diseased portion just as soon as it appears, and before it has had time to spread to any considerable extent.

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\* Charbon et Septicémie, Compt. Rend. lxxxv, p. 99.

In the fall, the leaves that are diseased, as well as the unaffected ones, fall to the ground. Here they decompose, and the bacteria are set free, for they do not decay, and are again carried to other localities. In this manner the disease is spread from one tree to another, and from one field or locality to another, and thus it is that the blight has been and is spreading all over our country. It is then readily understood why it is that, if one neglect to attend to his fruit trees, the blight will ultimately reach those of his neighbors.

During the past summer, I made pure cultures of the bacteria causing the blight in the pear, quince, apple, and a coniferous tree. These were made in nutrient gelatine by the usual method of plate-and-tube culture. In this way the bacteria from each kind of diseased tree were grown in separate tubes of gelatine, in which they fed and multiplied, and thus were obtained a large number of individuals of each special kind of bacteria, each tube containing but one kind or species.

Some of the bacteria from the tube containing the ones obtained from the pear-tree blight were then inoculated into the healthy leaves of a pear tree, by the use of a sterilized needle dipped into the culture and then pricked through the epidermis of the leaf. Many leaves were thus inoculated in different localities and on different trees, and each inoculated part labeled. In five days every leaf thus inoculated had taken the disease *blight*, thus proving that these special bacteria were the cause of the disease.

The same method was also followed in regard to the blight of quince and apple trees, and also with the conifera, and in all cases the inoculated leaves took the disease.

I then tried to determine, if possible, whether or not the bacteria causing the blight in the pear tree would, if inoculated into the quince or apple tree, give the blight to those trees; and whether or not the bacterium of the quince-tree blight would cause the blight in the pear or apple tree; and also the bacteria of the apple-tree blight cause the disease in the pear or quince trees. To determine this, I cross inoculated many leaves of the different fruit trees with the blight bacteria from the other kinds of fruit trees, and in no case was I able to produce the blight, except by the inoculation of the bacteria obtained from the blight of the particular kind of tree inoculated. It thus appears that each kind of fruit tree, at least so far as pear, quince and apple are concerned, has its special species of bacteria that produce the blight in that tree, and that this species of bacteria will not produce blight in the other kinds of fruit trees.

It should be mentioned here, however, that I was able to produce blight in three different species of coniferous trees by the inoculation of the blight bacteria obtained from but one species of tree.

#### REMEDIES.

From the above, it is readily seen that, since the cause of the blight is a minute plant—bacterium—that feeds upon and lives, grows and multiplies within the tissues of its host plant, we cannot reach the micro-organisms that are thus internal parasites, and kill them by the application of any substances to the tree in the form of a spray, as we can do for many fungoid diseases. We would kill the tree before the bacteria could be reached and affected. Hence the only means of combatting this disease *blight*, at present known, is the cutting off the affected portion far below the external signs of the disease. And since we have seen how the germs of this disease remain in the affected parts, as the leaves, that fall to the ground, and how they are liberated, and carried to infest other trees, it is plainly seen that, if we cut off the diseased branches and leave them upon the ground, we are doing them no good whatever, for we have killed nothing, but are simply

allowing the disease to multiply and spread so much the more, and next year the disease will appear with increased damage. The diseased portions of the trees that are cut off are to be gathered and burned, and especially the leaves, and thus the cause of disease will be destroyed and its spreading prevented.

*The simple remedy is, then, to cut off all blighted portions of the trees far below the parts that appear diseased, and to burn all these cuttings, especially the leaves. The sooner this is done after one discovers the blight in a tree the better.*

It is not enough that one thus guard his trees, while his neighbors neglect theirs. We must all fight this blight, which is doing more harm already than any other single disease. If every person will thus attend to his fruit trees, we can almost exterminate the disease in a very few years.

I am now experimenting on the application of chemicals to the soil, to be taken up with the sap in the spring, to kill or prevent blight, but as yet no definite results have been reached. Little has as yet been done in this line of preventing or curing bacterial diseases of plants, although the field looks promising, since we can in many cases cure bacterial diseases of animals by the internal application of chemicals.

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### APPLE-TREE BLIGHT.

BY G. C. BRACKETT, OF LAWRENCE, KAS.

This is a fungous disease, and, so far, has not been entirely under control. Certain treatments of orchard trees render them less liable to its attacks, and will arrest its spread and development, but are not always a preventive.

A too vigorous, succulent wood growth during seasons of rainfall and intense heat affords conditions congenial for the development of the germs. This condition is often the result of stimulating the growth by manuring the land and excessive tillage. Such treatment is not followed by the blight, except when accompanied with the atmospheric conditions of humidity and high temperature and a glaring sun upon the tree. We may have heat and a normal state of humidity and no blight, and we may have the humidity even to the saturation of the land with a low temperature and no blight. But a combination of the two, accompanied with a stimulated wood growth, is oftener the cause.

The safest treatment of the trees is that which produces a moderate development and well-matured wood growth by the first of August, when all cultivation should cease, and sooner if the trees are making too strong and vigorous a growth.

This disease is apt to be more prevalent in a new country, and in young orchards planted on newly-broken-up ground, because the virgin soil contains all the elements of fertility which nature's processes for ages have been storing in it.

This locality, Douglas county, and, I will add, most of the counties in eastern Kansas, in their early settlement, suffered seriously from this disease, because of the prevalence of a more humid atmosphere; but such trees have outlived it, and its occurrence has not been often in these later years.

It does not often ruin the tree. In most cases the recovery is quite rapid, and in after years it quite outgrows the damage.

It is always best to cut off the twigs and branches attacked, as soon as discovered, back to absolutely healthy wood, and to gather up the trimmings and burn them.

Some varieties are more susceptible to attacks of blight than others, and some suffer far greater injury from it. Of those recommended in the "Kansas List" (see this volume), named in the order of their susceptibility, are: Smith's Oider, Red

Winter Pearmain, Lowell, Willow Twig, Cooper's Early, Chenango, Wine or Pennsylvania Red Streak, Early Harvest. These are all desirable sorts, and one can well afford to plant them and take the risk of their blighting.

This disease is not confined to Kansas. Almost all of the Western and some of the Middle states have suffered as severely as has our own. To the novice, its appearance in his young and well-kept orchard becomes a source of worryment, because unexpected and not understood. But to the veteran it causes no great alarm, because he has had it to contend with in years gone by. It admonishes him of the need of a "little more care," and to some extent of his neglect of observations relating to existing conditions.

In time, with the assistance of scientists and thorough, practical appliances, this fungous enemy of the orchardist, as well as others of similar nature, will be brought under control, as present investigations and discoveries are rapidly progressing toward that period.

#### SOME FUNGOUS DISEASES OF THE GRAPE.—BLACK ROT OF THE FRUIT. —REMEDIES AND RESULTS.

COMPILATIONS BY G. C. BRACKETT, LAWRENCE, KAN.

In presenting this paper, I am fully aware of the skeptical feeling existing among some of our vineyardists, resulting from failures to obtain relief from the attacks of this fungous disease, while others are quite enthusiastic from satisfactory success.

Why some growers are successful and others fail in benefits cannot be determined without a knowledge of the details of the treatments used. It is a question beyond dispute that, with proper management, spraying with known fungicides has been and is still an efficient remedy for this disease and is sustained by the following reliable statements. First, I quote from the Delaware Experiment Station Bulletin No. 15, pp. 3-5:

"In 1888 the black rot held complete possession of the vineyard of Mr. Levi E. Anthony, at Smyrna, Del., and as a consequence he obtained from 1,200 vines less than 250 pounds of fruit; his loss that year being approximately 98 per cent. of a normal crop.

"In 1889 the vineyard was treated with the Bordeaux mixture. The season was an especially wet one, and every condition favorable to the disease prevailed. Notwithstanding this, 1,088 sprayed vines yielded 2,953 pounds of sound fruit, or 2.71 pounds per vine, as compared with .28 pound per vine the previous year. Although this represents but about one-fourth of a normal crop, the low yield is not all to be charged to the rot, but partly to an unfavorable season and partly to the diminished vitality of the vines, owing to the prevalence of disease during previous years.

"In 1890 the vineyard was treated for the second year, and, as a result, 879 sprayed vines yielded 7,451 pounds of sound fruit, or 8.47 pounds per vine, as compared with 2.71 pounds per vine the previous year, while an actual count showed but one-half of 1 per cent. of decayed fruit.

"In 1891 the vineyard was treated for a third year, and at harvest yielded 16,000 pounds of sound fruit from 1,200 vines, or 13.3 pounds per vine. An actual count made just before harvest revealed but five decayed berries in the entire vineyard. It must not be assumed that the exact yields of fruit just given are to be attributed solely to the results of spraying; for, if we replaced in 1889 all decayed berries with sound ones, the yield would still have been low, owing, no doubt, to a failure of the

vines early in the season to set fruit heavily; while, on the other hand, in 1891, the weather conditions were such that the vines bore abundantly.

"Notwithstanding this latter consideration, it is easy to see that the treatment was instrumental in effecting a gradually-increasing yield from year to year, for a study of the figures shows that the yields of fruit have increased in a considerably greater ratio than the increase in percentage of sound fruit, due to protection from rot. This is believed to be largely the result of a greater healthfulness and vigor of the canes; and this observation emphasizes an important principle which should be kept in mind in a consideration of the value of this and other like treatments; *i. e.*, that spraying not only serves to protect the fruit from decay, but also the wood and foliage from various forms of disease, such protection enabling vines to produce a full return under favorable or unfavorable conditions of season which may chance to prevail.

"The experiment, as a whole, teaches, that however seriously a vineyard may be infested by fungous diseases, such a vineyard can, by persistent application of Bordeaux mixture, be brought to a healthy condition and its normal bearing. Hence, if any farmer suffers from mildew, rot, anthracnose, etc., it is because of neglect, indifference, or ignorance of what experimenters the world over have repeatedly demonstrated.

"To those contemplating the use of the Bordeaux mixture, a few facts regarding cost may be useful. These are drawn from notes of the vineyard treated:

#### COST OF APPLYING THE BORDEAUX MIXTURE.

	1889.	1890.	1891.	Total.
Number of vines sprayed five times during season.....	1,088	879	1,300	3,167
Total cost of material and labor *.....	\$36 10	\$17 10	\$23 95	\$77 15
Quantity of fungicide used per vine for each application (gal.)†	0.20	0.33	0.20	.....

"These results were obtained by the following treatment:

"1. The vines were sprayed before the buds swelled with a solution of copper sulphate, 1 pound dissolved in 25 gallons of water.

"2. The Bordeaux mixture‡ was applied as follows: First application the first week in May and repeated every two weeks until four applications were made.

"3. Two weeks later, the vines were sprayed with the ammoniacal solution of copper carbonate."§

It must be borne in mind that the measure of success in using fungicides is governed by the thoroughness of the application. It is not desirable to drench the vines. As it is not the quantity of liquid applied, so much as it is the even distribution over all parts of the surface of the canes, leaves and berries that accomplishes their protection from the ravages of the fungus, a very thin coating of the liquid is sufficient at any time, and this must be maintained constantly against the washing off by rainfalls.

#### CORRESPONDENCE.

##### AGRICULTURAL EXPERIMENT STATION,

GENEVA, N. Y., September 8, 1893.

G. C. Brackett, Secretary:

MY DEAR SIR—I understand that spraying for black rot of grapes is very generally resorted to by the Hudson river growers; and correspondents from the Keuka lake region have informed me that more people use the remedy this year than ever before. Of course, when the work is carelessly done, or when it is not done at the proper time, the results are not so satisfactory, and no doubt your informant has reported upon the efforts of some such vineyardists. I have never observed that spraying with insecticides causes barrenness of the trees. Trees in the station orchard, which have been sprayed

\* Average cost of 2.43 + cents per vine for the season.

† Approximately, one-fourth of one gallon per vine for each application.

‡ Formula for Bordeaux mixture, see "Preparation of Fungicides," this volume.

§ Formula for ammoniacal solution, see "Preparation of Fungicides," this volume.

year after year, are producing a good crop of fruit this season. You might confer with Mr. G. C. Snow, superintendent New York grape exhibit, in horticultural building, regarding spraying for vineyard diseases. Mr. Snow has 70 or 80 acres of vineyard on the shore of Keuka lake, and is well posted in the methods that are in vogue in that region. Sincerely yours, *PETER COLLIER, Director.*

The following letter is from one of the most extensive vineyardists in the state of New York, who was superintendent of the very large state exhibit of grapes at the World's Columbian Exposition from that state:

*G. C. Brackett, Secretary:*

PENN YAN, N. Y., January 6, 1894.

I have no doubts of the good results to be obtained from spraying as a prevention of black rot and mildew of the grape. It has been shown so many times that it is of value that it seems almost like a waste of time to say more about it. But I am of the opinion that many of the failures in this work are due to improper management in the treatment. I have watched many vineyards, and the methods pursued by their owners in spraying, and wherever the work was done thoroughly and at the right time, it was a success. There is no doubt in my mind but that the salts of copper will prevent the attacks of black rot on the grape. In order to succeed with its use, the vineyardist must first understand that it is not a cure, but a simple preventive. No amount of spraying will cure a grape if it is already attacked. Hence, to be successful, it is necessary to have the fruit continuously protected. A spraying made on the first of July will not protect through the remainder of the season, if rainfalls occur. They will wash much of the mixture off. Nor is it to be supposed that all vineyardists will do the work as thoroughly as they ought until they have learned by sad experience the necessity of doing it well.

In the summer of 1892, I made many observations; and, while the season was damp and warm much of the time, conditions especially conducive to rot, the vineyards well and continuously sprayed escaped — scarcely a berry found affected; and in some instances vineyards 25 years old, which had been affected from their first fruiting; and although the grounds and surroundings were infested with great numbers of the germs of the black rot fungus, they were held in subjection by thorough spraying. A vineyard adjoining mine has never been sprayed, and its last season's crop was so badly affected that it was hardly worth the cost of picking, while my own was lightly affected. I am like some others who have to submit to loss caused by the negligence of my neighbors.

Now, tell your people to spray, and do it well and thoroughly and often, and they will, in my opinion, hold the disease in check. Yours, *G. C. SNOW.*

AGRICULTURAL EXPERIMENT STATION,

NEW BRUNSWICK, N. J., September 8, 1893.

*G. C. Brackett, Secretary:*

Replying to your inquiries in reference to spraying with fungicides and insecticides, in this state, I would say that evidence is cumulative in showing the beneficial effects of spraying for black rot of the grape, and the various insect pests. Vineyards that have not been sprayed show great loss from black rot, while those which have been sprayed for the past four or five years show but little indication, and the vines are perfectly healthy in appearance. Orchards, particularly of the pear and apple, are bearing perfect fruit year after year, where formerly the fruit was imperfect and the yield poor, owing to the ravages of insects. We have yet to learn of a case where spraying seems to have been injurious, when properly conducted.

Very truly yours, *E. B. VOORHEES, Director.*

AGRICULTURAL EXPERIMENT STATION,

ITHACA, N. Y., September 7, 1893.

*G. C. Brackett, Secretary:*

The statement that spraying vineyards and orchards in this state is being abandoned as a failure, which you say has been reported in your locality by some citizen of this state, is not true.

There have been some disappointments in spraying, and in very dry seasons there is likely to be less need of it; but, as a whole, spraying vines and orchards is an assured and established practice among the best fruit growers of New York state. Yours truly, *L. H. BAILEY, Prof. of Horticulture.*

## BROWN ROT OR DOWNY MILDEW OF THE GRAPE LEAF.

BY PROF. WM. O. STURGIS, AGRICULTURAL EXPERIMENT STATION, NEW HAVEN, CONN.

The fungus producing this disease is more disastrous to the vines themselves than the fungus of black rot, inasmuch as it attacks the leaves, causing them to turn brown and fall prematurely. Later it attacks the berries. The latter do not dry and shrivel as in the case of black rot, but they assume a grayish tint, the surface becomes discolored in places, especially near the stem end, and finally decay,



accompanied by a uniform brown color, destroys the fruit. On the leaves the disease is readily recognized by the grayish, downy or furred appearance produced on the under surface of the leaves by the fruiting threads of the fungus. This downy form of the disease may also attack the berries, and, under such circumstances, is unmistakable.

*Treatment.*—The ammoniacal carbonate of copper\* and Bordeaux mixture\* have both been used with success for this mildew. The former is to be preferred, because, while equally effective, it is cheaper than the Bordeaux mixture.

*Time of Application.*—The treatment should begin soon after the first leaves are formed, and should be repeated every 12 or 15 days until the berries begin to color. In order to insure perfect ripening of the wood, it is often well to make one or two sprayings after the fruit is harvested. Of course, if the vines are being treated for black rot, no additional treatment is needed for mildew.

#### ANTHRACNOSE.

This disease attacks the leaves, canes, and berries. On the leaves it produces small brownish spots with a slightly raised border. Later these spots become gray in the center and often separate from the surrounding healthy portions of the leaf, leaving the latter full of round or ragged holes. On the canes the effect is similar except that the spots often become confluent, producing large, elongated diseased areas, of a grayish color and slightly flattened or depressed. On the berries the spots are more nearly circular, and their appearance, gray in the center, with a reddish surrounding circle and a dark border, gives to the disease the common name of "bird's-eye rot."

*Treatment.*—The best remedy for anthracnose is to wash or spray the vines after pruning, and before the buds begin to swell in the spring, with a strong solution of sulphate of copper, using one pound to 10 gallons of water. Anthracnose is not liable to do much damage in a vineyard that is well treated for mildew or black rot, especially if the vines are severely trimmed.

#### SOME FUNGIOUS DISEASES OF THE BLACKBERRY, RASPBERRY, AND STRAWBERRY.

NOTES ON THE RED RUST OF BLACKBERRIES. BY B. T. GALLOWAY, U. S. DEPARTMENT OF AGRICULTURE.

The rust of blackberries and raspberries occurs in more or less abundance throughout the United States, being especially destructive in the Mississippi valley, where it attacks and often kills entire plantations of both wild and cultivated vines.

The rust, as is now pretty well known, is caused by a fungus whose whole life history has only been partially worked out. To horticulturists the presence of the parasite is first manifested by the appearance of pale yellow shoots among the more or less green and healthy ones. The under side of the leaves of the affected branches soon become covered with an orange-red powder, the change being due to the appearance of innumerable spores or reproductive bodies, which break through the tissues, and are scattered by insects, wind, and other agents. The office of the spores, formed as here described, is not definitely known; although it is claimed by Franzshel, of Russia,† that, under certain conditions, they infect healthy plants of blackberries and raspberries, and this infection results in the formation of an

\* See chapter on "Preparation of Fungicides," this volume.

† Hedwegia, vol. xxxii, 1893.

entirely different kind of spore. The last-formed spores, it is presumed, live over winter, germinate in spring, and give rise to the orange-red form. If this matter was definitely settled, it would have considerable practical importance in suggesting methods of treatment. We have shown elsewhere,\* that the vegetative portion of the fungus lives over winter in the underground stems of the plant; in other words, that it is perennial. With reference to the bearing of this point on the treatment of the disease, it may be of interest to quote from the article referred to.

"Some writers have claimed that the fungus does not live over winter in the root and stems; and, if this were true, it would seem possible to prevent the disease by the timely application of fungicides. Field experiments have shown that such applications, no matter how carefully made, have little effect, so far as diminishing the amount of rust is concerned.

"It is obvious that the immense number of spores, which form the reddish powder so familiar to every one, plays an important part in the life history of the fungus, and by destroying these spores, spraying may, indirectly, result beneficially. It is doubtful, however, if spraying with this object only in view will pay in the end. After all, it seems that the only practical and efficient method of dealing with this pest is the old one of grubbing out the affected plants as soon as they are noticed. It would be well, also, to discard those varieties known to be subjected to the trouble.

#### ANTHRACNOSE OF THE RASPBERRY AND BLACKBERRY.

BY PROF. W. C. STURGES, AGRICULTURAL EXPERIMENT STATION, NEW HAVEN, CONN.  
[Bulletin No. 115.]

This anthracnose produces on the canes small round or elongated whitish patches, slightly flattened, and bordered with a ring of dark purple. These patches gradually increase in size and number, and finally destroy the new growth or stunt it badly. Upon the leaves, it is often visible as very small yellowish spots, surrounded by a dark border, resembling those on the canes, but much smaller. The fungus producing the disease passes the winter in the diseased canes and leaves; a fresh crop of spores [seed] is produced from the old spots in the spring, and the new canes and foliage are readily infected.

*Treatment.*—As in the case of the grape anthracnose, cutting out all diseased wood and burning it will gradually eradicate the disease. It should be cut out in winter, or very early spring, below the lowest diseased spot. If the canes are then sprayed with a solution of sulphate of copper, using one pound to 25 gallons of water, and then sprayed two or three times during the summer† with Bordeaux mixture, very little damage is to be feared from the anthracnose.

#### LEAF BLIGHT OF THE STRAWBERRY.

This disease is characterized by the appearance of reddish areas on the upper surface of the leaves. Later there appear in the center of these discolored areas gray or whitish spots, upon which, in autumn and winter, are developed several forms of the reproductive bodies or spores of the fungus which causes the discoloration of the leaf.

*Treatment.*—By annually renewing the settings, and planting only in deep and thoroughly drained soil, the loss from blight will be very largely diminished. Removing and destroying all the old leaves after harvesting, followed by cultivation

\*Journal of Mycology, vol. vi, No. 3, p. 106.

†These summer sprays should be directed upon the young canes, especially.—SECRETARY.

and the application of a quick fertilizer,\* is a process which has produced good results. A more simple method, which has been adopted with complete success by some growers, is as follows: As soon as the berries are picked, run a mowing machine over the bed, cutting all the leaves close above the ground. As soon as the leaves and old mulch are dry enough, set fire to them, and burn the bed over. If necessary, loosen up the old mulch a little with a fork before burning, and put on more when it is scanty, in order to secure as even a burn as possible. Unless a severe drought follows, the plants soon put on a new, vigorous and healthy growth; mulch as usual in autumn. In a dry season this method must be used with caution, but if the burning is followed by rain the process has in all cases proved a complete cure for the leaf blight.

G. C. Brackett, Esq.:

CONNECTICUT AGRICULTURAL EXPERIMENT STATION,  
NEW HAVEN, CONN., January 15, 1894.

DEAR SIR—In reply to your letter of the 13th inst., I would recommend nitrate of soda, applied broadcast at the rate of 300 pounds to the acre, as a starter for strawberries after the treatment here recommended. It should be noted that burning over the beds must be practiced with caution in a very dry season; but the nitrate of soda is peculiarly adapted for use under such conditions, as it seems to check the too rapid transpiration of water, as well as to stimulate growth.

Very truly yours, W. O. STURGIS, Station Mycologist.

### BORDEAUX MIXTURE FOR APPLE PESTS.

BY H. GARMAN, ENTOMOLOGIST AND BOTANIST, KENTUCKY EXPERIMENT STATION.  
[Bulletin No. 44.]

Probably no enemy of the orchardist destroys more fruit and is the occasion of more loss in Kentucky than the rot fungus, known to botanists as *Glæosporium veriscolor*. It is no uncommon thing for three-fourths of all the fruit on a tree to be rendered worthless by its attacks. In the latter part of summer we find in many orchards the ground covered with well-grown apples, suitable for marketing as far as size and maturity are concerned, yet not worth gathering up because of the rot with which they are wholly or in part affected.

These fallen apples are as a rule not windfalls which have been invaded after they were blown down, but in most cases began rotting on the trees. Very many invaded apples can, during much of the summer, be found clinging to the branches, the rot forming a deep brown patch about the calyx end, or else starting from a break in the skin due to the thrashing of the twigs or the gnawings of insects; more rarely starting at the stem end of an apple, and gradually widening from this until the opposite pole is reached. Hundreds of dollars are lost each year from this destructive work on the fruit, and farmers known to me do not get enough apples for their own use, where in early days they secured splendid crops of excellent fruit. The rotting is not confined to particular varieties, though some are much more liable to it than are others. It takes fruit at any stage of growth, from the time it is about three-quarters of an inch in diameter until it is ripe. Damp weather appears to accelerate its injuries, but it is not dependent on this, and during the driest months of the driest summers may be found among growing fruit.

### THE SOURCE OF APPLE ROT.

It is sometimes assumed that this decaying of apples is a spontaneous breaking down and giving way to unfavorable influences of the atmosphere, of poor soil, deficient nourishment, and the like, just as a piece of meat becomes putrid when exposed to the air during warm weather. The decomposition of meat under such

\* For a fertilizer, see letter following.

circumstances, while apparently a spontaneous return to the earth and air of the substance of which it is composed, is really not strictly spontaneous at all, and if it were protected from the attacks of certain small fungi (the bacteria or microbes of current literature) it would not rot. This protection is what we afford to meat when we "can" it. It is what we do for fruit when we "put it up." In these cases, though the operator is often ignorant of the reason why his work, to be successful, must be done according to definite methods, the treatment is for no other purpose than to keep these commodities from the floating micro-organisms of the air. Expose such canned meats or fruits to the air and they will in the course of a few hours be found teeming with this minute life, and if left to themselves are speedily rendered unfit for use.

The rotting of apples on the trees is a very similar case, but the decay is much more evidently not spontaneous. It is just as certain that the apple rot will not attack fruit on the trees, if the spores of the fungus of which the technical name is given above does not get access to them, as it is that potatoes will not grow in a field in which no potatoes have been planted. The fungus causing this rot is a plant of rather complicated structure and life history, which is, as far as we know, dependent upon apples for its sustenance. The apple, then, does not become disorganized by the effect of the heat, moisture, or poor nourishment, but is destroyed by a vegetable parasite of relatively large size, being discernible when only slightly enlarged by the microscope, and in some of its conditions even perceptible to the naked eye. I dwell upon these things because there is a tendency to consider such diseases as this rot beyond our control, a tendency which often leads to a neglect of precautions which might easily be taken, and which would tend greatly towards remedying the evil done by the parasite. When it is impressed upon the mind of the fruit grower that *this rot is not due to the weather*, but to a parasite, I feel sure he will be prompt to take up the matter of stamping it out.

Doubtless most farmers have observed during the winter numbers of dried and shriveled apples clinging to the twigs of apple trees. These are generally the remains of fruit which rotted on the trees during preceding summers, and from some cause remained adhering to the twigs instead of falling to the ground. It has been suggested and believed that these mummified apples bear the spores of the fungus which attacks growing fruit, but I am not aware that anyone has hitherto tested the truth of this surmise by attempting to convey the rot to sound apples. In preparing for the experiments here reported, an examination of the orchard on the experiment farm was made early last spring before the leaves were out. It was found that most of the trees retained these withered apples. From a pint to a quart of them could have been taken from most of the trees. They varied from .24 to 1.36 inches in diameter, the smaller ones being much the more common, probably because the weight of the larger fruit invaded by rot tends to pull it from its attachment. A large proportion of the smaller examples stood upright on their stems, and it is apparent, therefore, that they were the remains of immature fruit. The tenacity with which these small ones adhere leads me to think they remain for several years on the trees. Of course it is not probable that all these mummified apples were destroyed by rot, but an examination of a considerable number of examples shows that most of them bear the spores of the fungus. In fact I have not thus far found a single example that did not bear some. Contrary to my expectation, they were more abundant, as a rule, on the smaller mummies. On specimens of an ash-gray color, the result of a lifting of the cuticle, they were especially abundant, the ruptured pustules beneath the cuticle still apparently containing a large part of the spores which developed there.

Thousands of the microscopic spores were thus embedded in a single one of these dried-up apples, and, as was proved by the experiment, they needed only to be introduced into the substance of sound apples to germinate and produce the characteristic change known as rotting. Again and again spores taken from the old fruit which remained on the trees during the winter of 1891-'92, and possibly longer, were seen to produce the disease and eventually to yield the black fruiting pustules containing new spores, when introduced into sound fruit taken from the cellar or obtained from the market. To test the matter still further, some of the spores were sowed upon sterilized gelatine containing an infusion of apple, and here the result was very much like that obtained by planting them on the apples. The gelatine, where invaded by the growing threads, became of a dark color, finally of a sooty black, and eventually small black nodules appeared at the surface containing the characteristic spores. These winter spores are very much larger than those produced during the summer, and are developed in the midst of the nodules instead of on the outside. Under the microscope they look not unlike a rather large elliptical seed. They are covered by a thick brownish outer coat, and contain a coarse granular material, in some instances, with one or several round, clear spaces. The latter become larger and more evident when they are placed in water or apple juice for germination. Those obtained from rotting apples are considerably smaller, on an average, than those grown on gelatine, as would be expected from the difference in the media. Examples from an apple destroyed by an artificially induced rot measured .027 mm. (.0011 inch) in length and .012 mm. (.0005 inch) in width. Other spores from a culture of the fungus made on gelatine measured .037 mm. (.0015 inch) in length and .015 mm. (.0006 inch) in width.

It will be seen by these measurements that the spores which convey the disease to fruit are very small—much too small to be seen with the naked eye—and yet they are as evidently the source of the rot which takes the apples as melon seeds are the source of melons which grow in our fields.

It is so evident from the most superficial study of the subject that the removal of the dried-up apples from the trees in winter would remove the source of contamination to growing fruit, that it seems strange that some practical man has not hit upon it as a means of preventing the mischief. Certainly thousands of minute spores, capable each one of destroying an apple, and then of generating new spores sufficient to take a crop, would be removed from the trees by this process. An experiment reported below seems to justify all that has been claimed for the procedure on general principles. In experiment 442, every one of these mummified apples, amounting to about a quart, was removed from the tree, and I believe it was during the summer the cleanest and most thrifty tree of any in the orchard, and in August it yielded the best fruit taken from any of the treated trees.

#### EXPERIMENTS 442 AND 443.

Early in the spring of 1892, before the leaves were out, every shriveled apple was removed from a tree in the experiment farm orchard, and it was then sprayed with Bordeaux mixture until the branches and trunk were gray. The tree selected for this treatment was one of two of the same variety, standing side by side. The name of the variety I am unable to give. It is said to be a Genet, and the fruit agrees in color, shape and to some extent in flavor with the Genet commonly used for winter keeping; but it is a fall apple, and averages larger than the late-keeping Genets grown in the same orchard. These trees were selected for experiment because of the tendency of their fruit to rot and fall off. In 1891 no apples of consequence were obtained from either tree because of the destructive work of the rot fungus. The

treated tree was given the number 442, and the check tree was numbered 443. They appear to be of the same age, but No. 443 is somewhat the larger, having thus a possible advantage in bearing power.

After the apples had "set," later in the spring, the whole orchard was sprayed for Codlin Moth, these trees receiving their share of the poison. This Codlin Moth work was done from May 16 to May 18, inclusive.

On May 23, No. 442 was sprayed with Bordeaux mixture, two gallons of the preparation being used.

June 6 the tree was sprayed again, about three gallons of the mixture being employed.

July 6 it received a third and final application, four gallons being used this time.

The tree received no other treatment during the season, but the lime and copper could be seen on the leaves and trunk at all times until cold weather set in. Between sprayings it was to some extent washed from the leaves most exposed to rains, but would probably have been evident in the fall if only the first application had been made.

The effect on the leaves of the spraying was very marked from the beginning. The tree bore a more thrifty appearance, the leaves were of a better color, and were actually larger than those of the unsprayed check tree. As the season progressed, the difference became more and more decided, and in the fall, when the unsprayed tree looked draggled and bare from the loss of leaves and the mutilation in one way or another of those remaining, the sprayed tree still bore a full load of well-developed, well-colored leaves. This difference was due to a number of causes. In the first place, the scab fungus (*Fusicladium*) worked without hindrance on the leaves of the unsprayed tree, causing some of the leaves to curl up, and checking the growth of the others. The spraying prevented the growth of this fungus almost entirely. In the second place, a peculiar spot disease of the leaves was very destructive to the unsprayed tree, and was much less abundant and did no perceptible harm to the sprayed tree. And finally, the insects which occur upon apple trees seemed to find the sprayed leaves less to their taste than the unsprayed ones. I attribute the small average size of the leaves of 443, as compared with 442, to the injury from the scab fungus and to the spot disease. As showing the condition of the two trees, towards fall, the following quotation is made from notes recorded August 27:

*Experiment 442.*—Tree in good condition. Leafage full. Some leaves turning yellow, but not more than should be at this season. Spot disease so noticeable on unsprayed tree does not show here except on occasional leaves, and has not done appreciable harm to these. Mixture abundant on trunk and lower leaves. Upper leaves pretty well washed clear. Very little evidence of the presence of the scab fungus on the leaves.

*Experiment 443.*—Leaves in very bad condition as to spot disease. Frequently with numerous small spots; often with extensive blotches, sometimes including whole leaf. Small spots often broken away, leaving holes in leaf. Many leaves down. Branches with a bare appearance, due to small size of leaves and to the falling of others. Some scab fungus on leaves.

*Fallen Apples.*—We began to examine the apples which fell from both trees on the 17th of June. Most of the apples then down were such as did not set, and perhaps would, in many cases, have fallen without respect to the spraying.

It was probably owing to the presence of these, and to the fact that no apples had hitherto been collected under the trees, that a larger number was obtained at this time beneath both 442 and 443 than on several succeeding dates. From the

sprayed tree we took 17 apples, and from its check 10. At the next date of examination, June 25, only two apples were taken under the sprayed tree and 10 were collected under the check. From July 1, the number of fallen apples gradually increased until the time of picking, August 20, when 149 were examined from the sprayed tree and 182 from the check. If it had not been for the storms of wind, the increase would doubtless have been quite regular until the last. It will be seen by reference to my table I (printed further on), that the number of fallen apples under the check tree was, with one exception, smaller at all dates of examination than under the sprayed tree. This was not due to a better condition of the apples as to rot; and, I think, is entirely the result of the fact that, while as many blossoms were formed on the check as on the sprayed tree, fewer of them resulted in fruit. The total number of apples collected beneath the sprayed tree was 488—just about 25 per cent. of the whole number upon the tree; and while only 395 apples were collected under the check tree, yet these constitute about 35 per cent. of the whole crop borne, giving a difference of 10 per cent. in favor of the spraying. In other words, this experiment shows, as far as one test can, that 684 apples would have fallen from the treated tree if it had not been sprayed, whereas the number which actually fell was only 488.

*Rot in Fallen Apples.*—The brown discolorations characteristic of this rot early made their appearance, and the fact that the number of affected apples gradually increased during the summer is not to be taken as an indication so much of an increase in their prevalence, as in the fact that their growth is rather slow, so that the result of injury is not an early loosening of the hold on the tree. Affected apples continued to grow, apparently, with undiminished rapidity, a state of things which is permitted by the almost invariable start of the rot at the eye. First and last, a good many apples were invaded at the side, the growth proceeding from breaks in the skin. But it was only occasionally that a genuine case of rot starting from the stem was observed. These facts suggest the probability of a transfer of the spores of the fungus to the young apples while the latter were still erect on their stems. Certainly the opportunity for infection at the eye of apples which hang eye downward is much reduced. Size and general vigor of fruit seem to have little influence either in discouraging or inviting attack. The largest, most symmetrical apples, without a blemish on the skin, as often showed the gradual spread of the growth from the eye as did the smaller, more defective ones.

The rot became unmistakable on the fallen apples about the 1st of July. In the middle of the month about half of all those down were affected. During August four collections were examined from each tree, and at each date of examination the number of affected apples was greater under the untreated tree, although the total number down was in each case less than the number from the sprayed tree.

In more definite terms, the proportion of rotting to sound apples grew less and less during the summer for the sprayed tree, and on August 20, was about 81 per cent. of the whole number down at this date, while the proportion of affected to sound apples from the check tree remained constantly in the neighborhood of 50 per cent. of the whole number fallen.

The total number of rotting apples taken from beneath the sprayed tree during the summer was 183, equaling  $37\frac{1}{2}$  per cent. of the whole number which fell from the tree.

The number attacked by rot taken under the check tree was 215, or  $54\frac{1}{2}$  per cent of the whole number which fell.

*Picked Apples.*—The rapidity with which the apples fell during the middle of August, indicated that they were ripening, and on the 20th of this month all were removed from the two trees under observation.

From the sprayed tree were taken 1,467 apples, weighing 222 pounds (averaging thus 2.40 ounces per apple), in the main symmetrical, clean skinned, and of good quality—certainly much the finest yield of fruit obtained from this tree during the three years I have observed it. One hundred and seventy-five (about 12 per cent.) of these picked apples were affected with rot, seven of them being entirely invaded, and the remainder in varying degrees.

From the check tree were taken 748 apples, weighing 53 pounds (averaging 1.12 ounces per apple). They were very irregular in size, often unsymmetrical, and the best of them were scarcely worth gathering. Three hundred and fifty-two (47 per cent.) of this lot were rotting, 51 of which were entirely destroyed.

Throwing out the rotting apples of both lots, we have, therefore, from the sprayed tree, 1,292, and from the check tree, 396, apples not affected with rot, there being a trifle over three times as many apples from the former as from the latter. But since the apples of the two lots differed widely in size and quality, a better idea of the result will be obtained from a comparison by weight. Estimating from the average weight of apples from the sprayed tree, we get for the 1,292 apples about 194 pounds, and in the same way, estimating from the average weight per apple, we get, for the 396 apples from the check tree, a total weight of 28 pounds, the check tree thus yielding by weight about one-seventh the product of the sprayed tree.

*Summary.*—It remains to bring together in one paragraph, for the sake of clearness, the general results of the spraying. The whole number of apples examined, including both fallen and picked, was, for the sprayed tree 1,955, of which 358 (about 18 $\frac{1}{10}$  per cent.) were affected with rot. The total number of apples from the check tree was 1,143, of which 567 (about 49 $\frac{1}{2}$  per cent.) were more or less injured by the rot fungus. Hence, if the sprayed tree had been affected with rot to the same extent as its check, it would have lost about 968 apples instead of 358. In other words, 31 $\frac{1}{2}$  per cent. of the whole number of apples borne by the sprayed tree during the season were saved from the rot.

Keeping in mind the fact that this is a single test on a single variety, we may consider that it proves, as far as it goes, that spraying with Bordeaux mixture, in connection with the removal of all dried-up apples on the twigs, results in the following benefit:

1. An increase in the size of leaves.
2. A prevention of the spot disease of leaves.
3. A prevention of the growth of the scab fungus on leaves.
4. An increase in the size and weight of the apples.
5. An increase in the number of apples.
6. A lessening of injury from rot.

#### EXPERIMENTS 444 AND 445.

Two young Ben Davis trees were selected for this test. They have always been among the most thrifty trees in the orchard, and stand near each other in the same row. The sprayed tree (444) has the appearance of being somewhat smaller, but in most respects the two are as much alike and as well suited for the purposes of an experiment as could be desired.

The withered fruit was not removed from these trees, and they received no attention until May 23, though they had been sprayed for Codlin Moth somewhat earlier. On May 23, No. 444 was sprayed with two gallons of Bordeaux mixture. On June 6 three gallons of the mixture were applied by spraying to the leaves, and on July 6 the same tree received four gallons of the mixture. It received no further treatment. The leaves were made quite gray with the lime and copper, and retained this hue until they fell in the autumn. There was a noticeable difference in the condition



of the leaves of the two trees with respect to the spot disease, but it was not as evident as in the case of experiments 442 and 443. There was no perceptible difference in the size of the leaves, and I am, therefore, disposed to attribute the splendid condition of the foliage on No. 442, as compared with No. 444, to the spraying done before the leaves appeared, and to the removal of the withered fruit. The leaves on 444 were, however, at all times in good condition, and were retained longer in the fall than were those on the check tree. The spot disease was started on both trees before the first spraying, and made perceptible progress during the season on the check tree, invading and sometimes completely destroying leaves. I could not see that there was any very marked spread of the disease on the treated leaves. In the fall when the apples were removed, the check tree had lost many of its leaves, some of the branches being quite naked. At the same time the leaves on the sprayed tree were more abundant and more uniformly distributed on the branches.

*Fullen Apples.*—As in the experiment already reported, the first examination of fallen apples was made on June 17, when 29 apples were collected under the sprayed tree, and 58 under the check tree. Doubtless, as in the other cases, most of these were apples which failed to set, and were not brought down by any special disease. At several subsequent dates of examination a smaller number of apples was examined, but with a gradual increase in the number, reaching in the case of the sprayed tree a maximum of 118 on September 9, after which date there was a very gradual decline until the time of picking the apples, when 51 were taken under the sprayed tree. In the case of the check tree the increase in numbers of fallen apples continued until August 27, when 174 were collected for examination, and afterwards a tolerably steady decline occurred, 38 being examined on the day of picking.

By reference to table I (printed further on), it will be seen that at each date of examination, up to and including September 2, a larger number of apples occurred under the check than under the sprayed tree. By this time most of the apples had fallen from the check tree, and on subsequent dates the relation was reversed, the sprayed tree from September 9 to September 30 losing the most fruit. From June 17 to September 30 the sprayed tree lost a total of 562 apples, while during the same period the check tree lost 1,181 apples. A comparison of these totals with the entire number borne by each tree shows that the fallen apples from the sprayed tree constituted about 46½ per cent. of the entire crop, while the check tree lost nearly 85 per cent. of all its fruit. From the above, it appears that the Bordeaux mixture kept from falling something like 39 per cent. of the whole crop, and that the apples which fell, notwithstanding the spraying, were retained longer on the tree than they would otherwise have been.

*Rot in Fullen Apples.*—The rot appeared on fallen apples from the sprayed tree more tardily than on the check, less than a fourth of the apples down on August 2 being affected, while at the same date, of apples collected under the check tree, nearly 44 per cent. were rotting. The record of examination of apples from the two trees is very similar to that of 442 and 443. The same gradual increase in the number of rotting apples was observed, with the larger number of decaying apples generally in the lots from the check tree. From the sprayed tree were obtained 187 affected apples, constituting about 35½ per cent. of all those which fell. Under the check tree we found during the summer 594 affected apples, or about 50 per cent. of all the fallen fruit.

*Picked Apples.*—The apples were taken from these two trees September 30, the sprayed tree yielded 655 apples, weighing 112 pounds; the check tree only 213 apples, weighing 87½ pounds. Among the former were only 11 apples (about 1⅞ per cent.) affected with rot. Among the 213 from the check tree were 54 (about 25½ per cent.) bearing more or less trace of rot. Omitting the rotting apples from both lots,

we have, as a result of the spraying, 644 apples on the treated tree, and 159 on the check. Oddly, the average weight per apple of the check lot was a trifle greater than that of apples from the other tree.

This may have been due to one or more of several causes. I am disposed to think it was a result of the fact that the apples had nearly all fallen from the check tree, leaving at the last only the more vigorous ones clinging to the branches; while on the other hand the sprayed tree retained apples of all sorts more persistently.

Estimating from the average weight per apple, we get for the sound apples taken from the sprayed tree a total weight of 110 pounds, as against a fraction over 28 pounds for the check lot. The sprayed tree consequently bore 82 pounds more sound fruit than its check.

*Summary.*—No. 444 yielded during the season, including fallen and picked apples, a total of 1,217 apples. The check, No. 445, yielded a total of 1,394 apples of all sorts. Under the sprayed tree and from it were taken 209 apples ( $17\frac{1}{2}$  per cent. of the whole number) affected with rot, and from its check 648 ( $39\frac{1}{10}$  per cent.) rotting examples were obtained, from which it is apparent that  $22\frac{1}{10}$  per cent. of the whole number of apples on the sprayed tree were kept from rotting—that something more than twice as many apples would have rotted if the tree had not been sprayed. The following may be given as the general result of the spraying in the two experiments:

1. A prevention of much of the spot disease on the leaves.
2. A prevention of the growth of the scab fungus on the leaves.
3. A lessening of injury from rot.
4. An increase in the final yield of sound apples.

#### EXPERIMENTS 446 AND 447.

Two more trees were selected for experiment in the spring of 1892, and were treated exactly as were 444 and 445. They were Russets, and both were of rather larger size than the trees used for preceding experiments. The treated tree received in all nine gallons of Bordeaux mixture—2 gallons on May 23, 3 gallons on June 6, and 4 gallons on July 6. The effect on the leaves of the spraying was, as in the other tests, decided, but was not so evidently in favor of spraying as in 442 and 443, in which, it will be remembered, the first application was made before the leaves came out. The spot disease was started on both trees before the bluestone was applied; hence the most that could be expected was the checking of its spread among the leaves. The effect of the mixture in preserving the leaves was seen in the latter part of August, when the upper leaves of the sprayed tree had been deprived largely of the mixture by rains. These leaves began to turn yellow and fall soonest, so that the branches became almost bare, while the lower branches still retained a full load of leaves. The leaves on the sprayed tree averaged the larger. In notes made August 27, the condition of the foliage is described as follows:

*Experiment 446.*—Leaves good in the main; some turning yellow; some spot disease; some fallen. Bordeaux mixture thick on lower leaves, mostly gone above, where leaves are thinner also.

*Experiment 447 (check).*—A scant load of leaves, many having fallen; branches in places bare from this cause. Spot disease rather common.

*Fallen Apples.*—The rate at which the apples fell from these trees agrees in the main with that of the other trees tested. The sprayed tree retained its fruit longest, the fallen apples rising to a maximum of 500 on the 9th of September, whereas its maximum number of 284 was reached by the check tree August 27. These apples should have been picked not later than the 1st of September. It was delayed until September 30, by which time most of them had fallen, the number from the check tree being at this date a trifle the larger. The apples which fell during September

were fully grown, and of as good quality as those finally taken from the branches. Under the sprayed tree were collected, up to and including September 30, 1,522 apples, as against 1,100 apples taken beneath the check, the latter having thus what looks like an advantage in the matter of keeping its fruit; but, as already explained, there were among these apples which should properly have been picked, and the rate at which the fruit fell from the two trees shows that the spraying served to keep the apples from falling. As it stands, about  $90\frac{2}{3}$  per cent. of the whole number borne were dropped by the sprayed tree, and  $86\frac{1}{4}$  per cent. of the lot borne by the check tree fell, giving a difference of  $3\frac{3}{4}$  per cent. in favor of the check tree.

If the apples had been picked, as they should have been, August 27, we should, up to and including that date, have collected beneath the sprayed tree, 606 apples, constituting  $39\frac{2}{3}$  of its whole crop; and 569 apples from the check, constituting  $44\frac{1}{3}$  per cent. of its whole number of apples. This would have reversed the relation, giving an advantage of  $8\frac{1}{2}$  per cent. to the sprayed tree, a result in close accord with those obtained in the other experiments.

*Rot in Fallen Apples.*—The 593 apples showing traces of rot, which were collected between June 17 and September 30 under the sprayed tree, make about 39 per cent. of the whole number of fallen apples. Under the check tree, 520 rotting apples,  $47\frac{2}{3}$  per cent. of the whole number down, were collected. The advantage in the matter of rotting is thus  $8\frac{1}{3}$  per cent. in favor of the apples collected under the sprayed tree.

*Picked Apples.*—It has already been explained that the apples had nearly all fallen off these two trees when those remaining on the branches were picked. We took, September 30, from the sprayed tree 164 apples, weighing 27 pounds, and from the check 172 apples, weighing  $29\frac{1}{2}$  pounds, giving a difference of  $2\frac{1}{2}$  pounds in favor of the check tree. Although the check tree had thus an advantage by number and weight, when we come to consider the proportion of rotting to sound apples, we find again a difference in favor of the sprayed tree—only  $24\frac{2}{3}$  per cent. of its fruit being affected, while  $33\frac{1}{3}$  of the check lot showed rot.

Properly, we should consider all the apples which fell from these trees after August 27 as a part of the crop to be harvested; and if we include these with those which were actually picked, we get 1,080 apples as the final yield of the sprayed tree, and 703 as the yield of the check. This, it will be seen, brings the result of the experiment more nearly into accord with the others. During this period, 39 $\frac{1}{2}$  per cent. of all apples from the sprayed tree showed rot, and  $50\frac{1}{2}$  per cent. of those from the check tree were affected. Omitting, as was done in considering the other experiments, all of these rotting apples, we should have from the sprayed tree 657 sound apples, weighing about 91 pounds, and from the check 350 apples not showing rot, and weighing about 48 pounds. We get thus a difference of 43 pounds of sound fruit in favor of the sprayed tree.

*Summary.*—The yield of fruit, including fallen and picked apples, was in this instance considerably greater for the sprayed tree than for its mate. We examined during the season, from No. 446, 1,686 apples, and from 447 only 1,272, but the percentage of rotting to sound fruit was, as in the other cases, in favor of the sprayed tree. Of the whole number of apples from the sprayed tree,  $37\frac{1}{2}$  per cent. showed rot. Of the check lot,  $45\frac{1}{2}$  per cent. were decaying. The difference,  $7\frac{1}{2}$  per cent. stands to the credit of the Bordeaux mixture.

In some respects this was the least satisfactory of the tests made. The large size of the sprayed tree, especially the wide extent of its branches, may have made the difference, by preventing the same thorough application of the mixture to the leaves and fruit that was made in the other cases. Whatever the cause may have been, it did not affect the general result, and we may say of this test, as of the others, that

the spraying produced a better condition of the foliage, a larger number of usable apples, and a smaller percentage of injury from rot.



This diagram represents the apples borne by each of the six trees under observation, the black showing the per centage of rot: 442, sprayed; 443 check on 442; 444, sprayed; 445, check on 444; 446, sprayed; 447, check on 446.

#### GENERAL SUMMARY.

The results of each experiment have already been given. It remains now to call attention to the features in which these results differ and agree among themselves, for by this means we shall approach the average result, and may hope to learn something of what could be done by spraying an orchard consisting of trees of various sorts.

In the first place, all the tests show an improved condition of the foliage. The leaves of two of the sprayed trees (442 and 446) were larger than those of their respective checks, and in all three of the sprayed trees they were more perfect, being less injured by insects, by the spot disease, and by the scab fungus. Throughout the summer the trees to which the mixture was applied were more thrifty in appearance, owing to the more healthy green and better general state of foliage. In every case the leaves began to fall sooner from the checks than from their mates. The improved condition of the leaves must have a decidedly beneficial effect on the quality and size of fruit, and I am disposed to think the final increased yield of fruit from the sprayed trees was due in no inconsiderable extent to this indirect effect of the Bordeaux mixture, and not solely to its direct effect upon the rot fungus. In the matter of its foliage, No. 442 was in much the best condition of the three—was in fact very much the finest-looking tree in the orchard. The improved result in this case was, I am satisfied, due to the difference of treatment, *i. e.*, to the removal, in the case of 442, of the old apples from the branches and the application of the mixture before the leaves were expanded.

Spraying can only influence the total number of apples of all sorts borne by a tree when it is applied before the leaves and blossoms are out. In the only case in which this was done, the total number, 1,955, was not only largely in excess of the number from the check tree, but exceeded the yield of every other tree under observation. While a single test cannot be considered proof that such treatment would always, or generally, have the same effect, the presumption is, from the very decided result obtained in this case, that the method employed in experiment 442 will have the effect of increasing the total number of apples.

The proportion of rotting to not rotting apples was in every case lessened by

spraying, and we are in a position to say, as a result of these experiments, that spraying with Bordeaux mixture will save from rotting from  $7\frac{1}{2}$  per cent. to  $31\frac{1}{2}$  per cent. of the whole number of apples. Here again the result is decidedly in favor of spraying before the leaves are out, the number of apples saved being 10 per cent. greater for No. 442 than for the best of the other trees.

The result in usable apples is the crucial test of the experiments. From No. 442 were obtained 194 pounds of usable apples; from its check, only 28 pounds, giving an excess of 166 pounds in favor of spraying. From No. 444 we took 110 pounds of good apples; and from its check only 28 pounds, the difference in favor of spraying being here 82 pounds. From No. 446 were secured 91 pounds of good fruit, and from its check 48 pounds, the sprayed tree having the advantage by 43 pounds. In other words, the spraying increased the yield of usable apples from a little less than twofold to nearly sevenfold. The average of the increased weight due to spraying, for the three trees, is 97 pounds, which may fairly be considered the increased weight of usable apples which can be expected from trees of all sorts as a result of spraying. In an orchard of 500 trees, we might, therefore, expect to increase the weight of usable apples 48,500 pounds.

#### EXPLANATION OF THE PLATE.

Fig. 10.—Showing the apples picked September 30 from No. 444 (sprayed tree). From a photograph.

Fig 11.—Showing the apples picked September 30 from No. 445 (not sprayed). From a photograph.

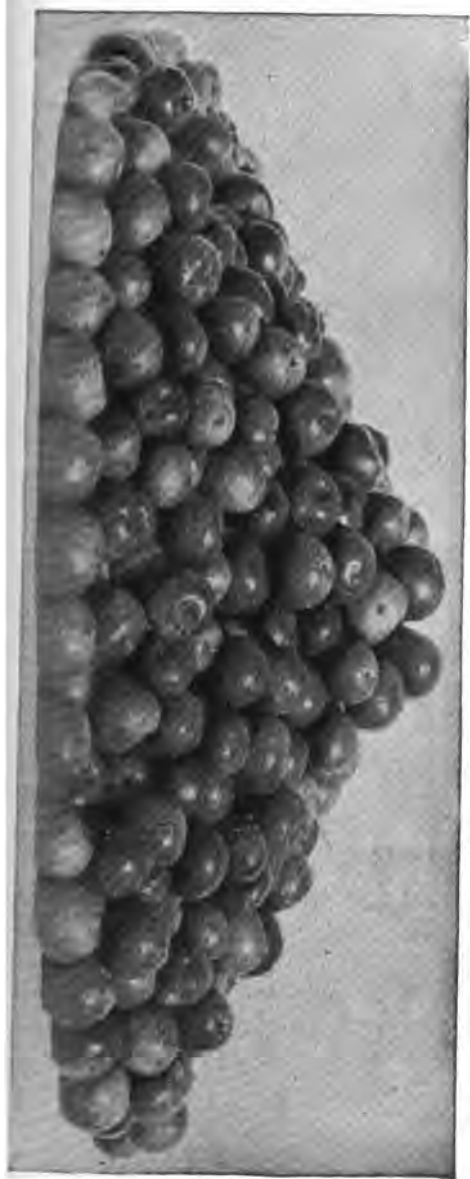


FIG. 10.



FIG. 11.



TABLE I.—GIVING THE RESULTS OF AN EXAMINATION OF FALLEN APPLES FROM SIX TREES.

	EXPERIMENT 442. Sprayed.			EXPERIMENT 443. (Check) Not sprayed.			EXPERIMENT 444. Sprayed.			EXPERIMENT 445. (Check) Not sprayed.			EXPERIMENT 446. Sprayed.			EXPERIMENT 447. (Check) Not sprayed.		
	Number of fallen apples.....	Fallen apples showing work of Cod-lin Moth.....	Fallen apples showing rot.....	Number of fallen apples.....	Fallen apples showing work of Cod-lin Moth.....	Fallen apples showing rot.....	Number of fallen apples.....	Fallen apples showing work of Cod-lin Moth.....	Fallen apples showing rot.....	Number of fallen apples.....	Fallen apples showing work of Cod-lin Moth.....	Fallen apples showing rot.....	Number of fallen apples.....	Fallen apples showing work of Cod-lin Moth.....	Fallen apples showing rot.....	Number of fallen apples.....	Fallen apples showing work of Cod-lin Moth.....	Fallen apples showing rot.....
June 17.....	17	2	.....	10	1	.....	29	1	1	58	27	.....	16	1	2	10	.....	.....
June 25.....	2	.....	.....	10	.....	.....	12	.....	.....	30	5	1	5	.....	1	14	.....	8
July 1.....	6	8	1	5	1	2	11	.....	1	35	.....	2	10	.....	8	.....	.....	.....
July 8.....	9	.....	8	8	.....	2	9	.....	1	34	4	8	11	.....	7	5	.....	8
July 15.....	28	11	12	16	6	5	18	7	7	35	5	5	6	.....	6	12	.....	10
July 22.....	52	33	18	29	19	5	8	2	2	38	10	5	87	5	30	16	2	13
August 2.....	94	41	50	71	56	10	32	7	11	83	36	17	46	8	33	44	7	33
August 5.....	41	13	19	38	16	15	26	12	7	111	50	22	89	7	45	32	3	22
August 12.....	95	84	51	76	41	17	24	14	7	98	43	26	46	7	30	51	11	34
August 20.....	149	46	98	132	75	51	10	5	5	168	99	58	90	29	58	101	17	78
August 27.....	.....	.....	.....	.....	.....	.....	47	25	25	174	128	98	280	159	206	284	194	139
September 2.....	.....	.....	.....	.....	.....	.....	42	9	33	82	39	64	280	106	161	189	86	157
September 9.....	.....	.....	.....	.....	.....	.....	118	64	82	102	56	77	500	218	872	222	143	136
September 17.....	.....	.....	.....	.....	.....	.....	72	23	57	72	46	38	70	22	53	59	84	46
September 23.....	.....	.....	.....	.....	.....	.....	55	10	50	38	25	25	59	19	47	30	16	19
September 30.....	.....	.....	.....	.....	.....	.....	51	19	43	38	21	21	57	17	30	31	17	23



TABLE II.—GIVING RESULTS OF AN EXAMINATION OF BOTH FALLEN AND PICKED APPLES FROM SIX TREES.

Experiment 442. Sprayed.....	488	183	287	1,467	175	538	1,955	358	792	222
Experiment 443. (Check.) Not sprayed.....	395	215	107	748	382	199	1,143	597	306	53
Experiment 444. Sprayed.....	562	198	332	655	11	208	1,217	209	540	112
Experiment 445. (Check.) Not sprayed.....	1,181	594	462	213	54	50	1,394	648	512	371
Experiment 446. Sprayed.....	1,522	593	1,084	164	41	50	1,686	634	1,134	27
Experiment 447. (Check.) Not sprayed.....	1,100	520	716	172	57	78	1,272	577	794	284

## APPLE SCAB.

While the experiments with Bordeaux mixture were undertaken primarily for the purpose of learning what effect the preparation would have on the rot fungus, several minor objects were kept in view, one of which was to learn the extent to which scabbing of the fruit would be prevented. It has already been stated that the scab fungus was less abundant on the leaves of No. 442 than on those of No. 448, its check. The fruit, also, was less injured by the fungus on the sprayed tree than on the check. No detailed record of the relative injury was kept. The scab fungus did not appear on the Russet trees (446 and 447). It was apparent on both of the Ben Davis trees (444 and 445), and record of its injury was made from September 2 to September 30, inclusive.

Under No. 444, during this time, 338 apples were collected, 53 of them more or less scabbed. On September 30, from this same tree, we picked 655 apples, of which 62 showed the scabbed skin. We thus obtained a total of 993 apples, with 120 ( $12\frac{1}{5}$  per cent.) scabbed ones among them.

Under the check tree, No. 445, apples to the number of 332 were examined, of which 189 were scabbed. Two hundred and thirteen apples were picked from this tree, having among them 170 with scabbed surface. Of the total number (545) examined from the check tree, 359 ( $65\frac{8}{9}$  per cent.) were scabbed.

On two occasions, May 28 and June 6, after spraying the trees upon which we were making regular observations, the surplus Bordeaux mixture was sprayed upon a Genet tree which stood near, being one of several in a row. It was noticed from time to time that its leaves and fruit appeared to be in better condition than those of its fellows of the same variety, but it was given no further attention until the time of picking, on October 8, when the apples from this tree and those from another one as nearly like it as could be found were compared. It was found that the apples on the sprayed tree averaged considerably larger and were comparatively but little injured by the scab. Of 143 pounds of fruit from this tree,  $45\frac{1}{2}$  pounds ( $31\frac{1}{6}$  per cent.) were scabbed.

The apples from the check tree were almost worthless, being small and misshapen, and of 67 pounds taken from the tree there was not a single apple that was not scabbed.

It is believed that the scab fungus lingers about the trees in the form of spores during the winter, and hence the early spraying practiced in the case of No. 442 might be expected to prove more effective, even, than applications made later in the season. The scab gets an early start, and trees on which its injuries are severe ought, at the latest, to be sprayed as soon as the fruit is set. Two sprayings early in the season ought to prove sufficient. A single spraying before the leaves expand would probably do much to lessen injury from the disease.

## CODLIN MOTH.

It has been claimed that the gnawing of insects occasions much of the rot which invades and destroys fruit. In early times insects were thought to be the direct cause of the decay. Rotting patches were so frequently observed about the punctures made by curculios and other insects, that it was a very natural supposition that the admission of the air and moisture from without was all that was necessary to induce decomposition. With a better knowledge of the parasitic fungi, we are now in a position to assert positively that these latter are the primary cause of several of the rots, and that as far as such rots are concerned the gnawings of insects have only the indirect effect of admitting the fungi to the fruit. Of course, where the rot fungus is dependent upon such accidental openings for access to fruit, the work of

insects is an important factor in causing decay. This appears to be the case with the brown-rot fungus of peaches, plums, and cherries. There can be no doubt but that insects are important agents in giving this rot a start, and remedies for it should consequently always take insect injury into account.

The spread of apple rot due to *Glæosporium*, the fungus causing rot, one would suppose on general principles to be also greatly influenced by insect injury, but, from its habit of entering apples at the eye, breaks in the skin are not essential to it, and the work of the Codlin Moth influences its spread less than would have been expected. If the mining done by the Codlin Moth tends to increase the destructive work of this rot fungus, we should find with an increase in the percentage of injury by Codlin Moth an increase also in the percentage of injury from the rot fungus. The apples examined last summer give us no very safe foundation for a conclusion on this point. For no just comparison can be made between a sprayed tree and one not sprayed, because of the positive effect of the Bordeaux mixture in checking the rot. Nor can a comparison between trees belonging to different varieties be expected to give a decisive answer to this question. Some varieties are more susceptible to Codlin Moth injury—more attractive to the insect; and the same is true of the fungus—certain kinds of apples being generally badly infested, while others are much less so. A just comparison could only be made between trees of the same variety all of which were either sprayed or not sprayed.

However, an examination of the tables accompanying this paper will throw some light on the relation between the two kinds of injury.

Taking the sprayed trees first, we find that the percentage of Codlin Moth injury was greatest on No. 446, and that this tree had also the highest percentage of injury from rot, which, as far as it goes, is evidence in favor of an increase in rotting with an increase in Codlin Moth injury. But the next highest injury from the insect (on No. 444) is accompanied by the lowest percentage of injury by rot which occurred on any of the sprayed trees, No. 442 having a slightly higher percentage of injury by rot than No. 444, with a lower relative injury by the insect.

A comparison of the unsprayed trees gives a somewhat different result. The highest percentage of injury by Codlin Moth occurred on 447, and was accompanied by the lowest injury from the rot. No. 445 comes next in order, with a percentage of injury by Codlin Moth considerably lower than No. 447, but with a higher percentage of rotting apples. No. 443 completes the series, with the lowest rate of injury by moth, and the highest rate of injury by rotting. Here we have just the reverse of what would have been expected—a regular increase in rotting with a decrease in insect injury. When we remember that we found a similar relation of the two kinds of injury on two of the sprayed trees (444 and 442), it begins to look as if the injury from Codlin Moth lessened the injury from rot. But we cannot entertain such a conclusion for a moment when we know the readiness with which the spores of the fungus grow whenever they fall upon the exposed substance of an apple. The mining of the Codlin Moth must inevitably increase opportunities for the rot to invade the fruit, and it remains to determine to what extent the work of the insect does increase the rotting.

#### THE CODLIN MOTH AVOIDS ROTTING APPLES.

The truth of the matter is, that the female Codlin Moth when depositing her eggs avoids those apples which have the rot started at the eye, and selects the best fruit within reach. In short, the rot fungus is a sort of rival to the Codlin Moth, although the work of the latter is rather favorable than otherwise to the fungus. This explains the fact that in every case of reduced injury from rot as the result of spraying there was last summer an increase in the percentage of injury from the

moth. The insects placed their eggs upon the fruit most likely to reach maturity and give the young a chance to attain their growth. The rotting or otherwise injured apple is not so likely to give the young this opportunity, and the instinct of the moths guided them in avoiding such fruit. This supposes the rot to have possession of the field when the moth is ready to place its eggs. And it may be objected, that since the eggs of the moths are laid in the calyx end of the apple as soon as the latter is formed, and since the rot does not make its appearance until some time later, the rot fungus can have no such influence on the work of the moth as I have suggested.

In the case of the six trees under observation last summer, it was certainly true that the first brood of Codlin Moth was not influenced in this way by the rot. In fact, this brood did very little harm to apples on the trees selected for my experiments. But we have, it seems, to provide at this latitude for the injuries of a second brood of the Codlin Moth, which last summer appeared long after the rot was started, and did its worst injury to the apples when these were nearly ready for use. Neither the spraying with Paris green given early in the spring, nor the Bordeaux mixture, had any perceptible effect on this brood, and an inspection of the tables will show that the worst harm was done in every case on the sprayed trees.

Thus, No. 442 had  $40\frac{5}{10}$  per cent. of its whole crop affected with Codlin Moth, and its check had only  $26\frac{5}{10}$  per cent. affected. No. 444 showed an injury from Codlin Moth amounting to  $44\frac{4}{10}$  per cent. of its whole crop, while No. 445, the check tree, showed  $36\frac{7}{10}$  per cent. injury. On 446 the injury amounted to  $67\frac{8}{10}$  per cent. while on 447 it reached only  $62\frac{5}{10}$  per cent. of all the apples. We are thus driven to the conclusion that the insects selected the trees bearing the finest fruit, and that they avoided the apples already invaded by rot. If the second brood continues in future to be as destructive as last season, it will be necessary to adopt other means of combating this pest than by spraying trees in early spring, for it is evident that spraying at that time is only calculated to check the injuries of the spring brood.

#### CONCLUSIONS.

The conclusions to be drawn from the data contained in the preceding pages have been incompletely presented in the different sections of this paper. As a matter of convenience, it may now be advisable to bring together what the author considers the important results of the experiments, considering the effect of spraying on injury of all sorts, insect and fungus.

1. The advantages of spraying may appear at first thought to be to some extent offset by the higher per cent. of Codlin-Moth injury which occurred on the sprayed trees. Practically this result has not the importance that might at first appear. Insects always concentrate where they find the most abundant supply of suitable food. The fact that the Codlin Moth congregated on the sprayed trees is, consequently, evidence that the treatment greatly benefited the fruit. If we keep it in mind that the spraying did not increase the number of Codlin Moths in the orchard, but only led them to desert the poorer fruit of unsprayed trees for the better fruit of sprayed trees, it will be clear that, if we had sprayed the whole orchard, no increase of injury would have been witnessed, because the moths would, under the circumstances, have remained scattered.

None the less, it is important that some means of combating the second brood of moths should be found, and, in the absence of experiments showing what can be done, I would suggest the use of Paris green, to be applied not earlier than July 1, in the proportion of 1 pound to 160 gallons of water.

2. The improved condition of the foliage is a gain which is not to be over-

looked, since it is calculated to have a most beneficial effect on the fruit. It seems to be an invariable result of spraying.

3. The spraying prevented premature falling of both leaves and fruit.

4. The increased weight of apples yielded by the sprayed trees is its own commentary on the good effect of spraying.

5. In only one case was there a decided increase in the size of apples (on No. 442), and this was where the tree had been sprayed before the leaves were out, and the old apples had been removed. On the trees not so treated, no difference of consequence was observed between apples from sprayed and check trees. We must conclude, therefore, that the single case of increased size was the result of the early treatment, or else, as it easily might be, was a chance occurrence, due possibly to some difference in the condition of the trees. I am disposed to think it the result of the treatment in this case, but have no ground for insisting on this view other than that the two trees had been observed with some care for several seasons, and no special difference between their fruit or foliage was observed during seasons preceding that of 1892. However, it is a matter to be settled by further experiment.

6. The diminished injury from scab was decided, and is an important gain. The result was invariable on trees affected with this disease.

7. To learn the effect of Bordeaux mixture on apple rot was the main purpose of the experiment. The results were always in favor of spraying.

*Note.*—The Bordeaux mixture was applied with a Climax pump No. 2, made by the Nixon Nozzle and Machine Company, of Dayton, Ohio. The mixture was prepared by the following formula:

- (a) 22 gallons of water.
- (b) 6½ pounds of bluestone.
- (c) 3½ pounds of fresh lime.

Dissolve *b* in three or four gallons of hot water taken from the supply, *a*. Slake the lime, and make of it a paste about as thick as cream. Now stir the latter into the bluestone solution, and finally turn the whole into the remaining water. The preparation may be applied with great freedom without injuring foliage.

## APPLE SCAB ONE OF THE CAUSES OF ROT OF THE FRUIT.

BY PROF. W. J. GREEN, OHIO AGRICULTURAL EXPERIMENT STATION.

[Extracts from bulletins.]

"In the fall of 1891 a duplicate series of experiments was commenced with Baldwin, Bellflower, Newtown Pippin, Northern Spy, Smith's Cider, and Seek-no-Further, to determine the relative keeping qualities of scabby apples and those free from scab. One hundred apples from each lot were selected, the scabby ones being taken from unsprayed trees, and those free from scab from those sprayed; all that showed indications of decay, as well as all wormy specimens, were rejected. Essentially the same results were obtained with the different lots. There were such variations as might be expected, but none contrary to the general rule which was manifest in all cases, and may be stated as follows: Apples free from scab kept much better than scabby ones, but the greatest difference in keeping qualities was shown soon after the fruit was stored. This difference gradually diminished until the keeping qualities of both lots were nearly the same, but some of those free from scab were found to be sound for some time after all the scabby apples had rotted.

"The following example, taken from the results secured with the Newtown Pippin, illustrates the above statement: The apples were stored October 30, and were exam-

ined at frequent intervals. The total numbers found to be rotten at certain dates are given:

	Dec. 4.	Dec. 25.	Feb. 19.	Mar. 30.	May 8.	June 14.
Free from scab—whole number rotten .....	4	13	45	66	79	100
Scabby—whole number rotten .....	12	27	78	98	100	....

"In the first period of a little more than a month, three times as many of the scabby as of those free from scab rotted, and with several other varieties the difference was nearly as great. The average number rotten in 10 lots was, 25 not scabby to 40 of the scabby. A more marked difference was shown in most varieties at the end of the first period of two weeks.

"If we take all the varieties except Newtown Pippin, (none of which had rotted at the end of two weeks,) it is found that on an average 5 not scabby had rotted to 13 of the scabby. If we compare those lots which kept until February 19, we find that 71 not scabby and 87 scabby had rotted.

"This shows clearly that the effect of the apple scab in causing rot is most marked at an early date, or soon after the apples are picked and stored. No doubt it often causes rot before the apples are gathered. The scab fungus is, of course, only indirectly the cause of rot, but it undoubtedly is the source of great losses to the orchardists. Probably 50 per cent. of the early decay of apples can be prevented by the use of proper remedies. Spraying to prevent the apple scab would no doubt pay, if for no other purpose than to improve the keeping qualities of the fruit.

"The spring and early part of 1892 was noted for the great amount of rainfall, and the work of spraying was seriously interfered with. The same orchard of Newtown Pippins was operated upon as in the season previous. Different mixtures were tested, but, owing to the excessive rainfall, some were washed off more than others; hence a fair comparison could not be made. The crop was not good in any part of the orchard, but one fact may be mentioned as worthy of notice: Three rows, running across the orchard, were left unsprayed, but none of the trees in these rows had any apples on worth picking, and but few of any kind. Had the entire orchard been left unsprayed, the crop failure would have been the same on all parts, and the explanation that the frequent rains prevented pollination of the blossoms would have been considered sufficient. There was sufficient bloom for a fair crop, but the above cause cannot be assigned, for the reason that on the sprayed trees there was a partial crop, differing, of course, according to the efficacy, or rather to the adhesive quality, of the mixtures. Four rows on the east side and four rows on the west side of the orchard were sprayed with dilute Bordeaux mixture, and these rows were the only ones where anything like a satisfactory crop was found. That the application of this compound saved at least one-third of a crop, is undeniable; but in what way was this result accomplished?

"When the young fruit is severely attacked by apple scab it is often destroyed, and the action of the Bordeaux mixture was to prevent this to some extent; hence the partial crop where it was applied. At present this explanation seems tenable, and no other can be offered which will meet the case.

"This treatment is not likely to lead to any serious consequences in practice, and may be the means of saving crops that would otherwise be lost.

"On another plat the treatment was with the same mixture, but the first application was omitted. The difference between this and the other plats was considerably in favor of the early spraying. It thus appears that the mixture used must be adhesive, and the first application must be made early in the season, before the buds

open. There can be no question regarding the correctness of these conclusions, but the claim is not made that early spraying with any particular mixture will always insure a crop. Much depends on the weather and other conditions. When the rainfall is abundant, and other conditions favorable for the early development of the scab fungus, the proper use of fungicides may be expected to have an effect similar to that above indicated; but in seasons when the scab finds unfavorable conditions for development, the same treatment would show less marked results. The scab does more or less injury in all seasons, but it does not always get sufficiently started early enough to cause the destruction of the young fruit; but whatever the character of the season, early spraying is advisable.

"It is best to make two applications before blooming, and two after—the first just before the buds open, using either dilute or strong Bordeaux mixture, but preferably the latter. The second is to be made just before the blossoms open, using same compound. For the third application, which should be made as soon as the blossoms have fallen, use the dilute Bordeaux mixture, and to this add 4 ounces (or one-fourth of a pound) of Paris green or London purple to 50 gallons of the mixture. About this time the Codlin Moth lays its eggs in the blossom end of the apples. These eggs soon hatch, and the young worms are killed by eating the poison, which explains the use of London purple or Paris green above recommended with the third application. Another—the fourth application—should be made 10 days from the time of the third, using the same combination mixture.

"No further spraying during the season is advised. But, if desired, the ammoniacal solution of carbonate of copper may be used some weeks later; but it is better to discontinue the use of the Bordeaux mixture at the time specified, as it sometimes causes a russet appearance on the fruit, if applied too late. So far as observed, late applications have not been very beneficial, and four seem to be sufficient."

### CAN PEACH ROT BE CONTROLLED BY SPRAYING?

BY PROF. F. D. CHESTER, DELAWARE AGRICULTURAL EXPERIMENT STATION.  
[Bulletin No. 19.]

In 1891 an experiment was conducted by the station upon the farm of Dr. Hugh Martin, of Seaford, with a view of discovering a remedy for peach rot.

In this experiment, 10 trees, containing several of the early varieties, were utilized. The first application was made on June 3. At this date the peaches were just beginning to show signs of rot. This was followed by two other applications, made June 8 and June 23.

July 3 I visited Seaford preparatory to picking; found sprayed trees loaded with ripening fruit in excellent condition. Unsprayed trees contained scarcely a sound peach. At harvest, sprayed trees yielded, of sound fruit, 693 pounds; more or less decayed fruit, 94 pounds. Percentage of sound fruit on sprayed trees, 89.1; percentage of sound fruit on unsprayed trees, 0.

The results of the work of 1891 were sufficiently encouraging to induce us to continue; accordingly certain experiments in the same line were planned for the following year, 1892.

The following recommendations are based upon the experience in 1892:

1. It has been shown in the report of this station for 1891 that the principal source of infection in this disease exists in the decayed fruit which is permitted to remain on the trees after harvest. The labor of removing this infectious material

may seem formidable, but I am convinced that no treatment will be effective without it is done, and I am equally convinced that the labor so spent will yield to the grower a return far greater than its cost. I would, therefore, urge that no mummified fruit be allowed to hang to the trees through the winter, but that it be removed either at the time of picking or soon after.

2. Early in the spring, before the fruit buds begin to swell, spray the trees with a solution containing one pound of sulphate of copper to 25 gallons of water.

3. As soon as the fruit begins to swell, spray the trees with the neutral Bordeaux mixture, which is made by dissolving four pounds of copper sulphate in hot water. Cool the solution by mixing six or eight gallons of cold water. Then add milk of lime until red litmus paper (obtained of any druggist) dipped into the mixture just begins to turn blue. Then dilute with water to 25 gallons. Follow this with another spraying before the buds open. The object of the preceding applications is to protect the blossoms from the blight caused by the peach-rot fungus.

4. As soon as the fruit shall have reached full size and begins to show signs of color, make a third application. This should be followed by two or three other applications at close intervals, of five or seven days, during the ripening period.

It should be noted here that a heavy rain followed by warm weather may, at this vital period, cause the peaches to rot rapidly; hence, due regard should be given this point in regulating the exact time when a spraying should be made. Due attention to this principle may save hundreds of baskets of fruit, and the grower can well afford to make spraying at the right time his first business.

Is the question asked: "Can peach rot be wiped out of our orchards, even in those containing the early-rotting varieties? Can the work be made as effectual and complete as it has been in the case of grape rot?"

Were it not that positiveness of statement is unscientific, I should say that it can. Not by a single year's treatment, but by continued attention for several years to the rules just laid down.

#### AN EXPERIMENT ON PLUM ROT.

BY PROF. H. GARMAN, KENTUCKY AGRICULTURAL EXPERIMENT STATION.

[Bulletin No. 47.]

Several plum trees standing near the house on the experiment farm have always been affected with the brown rot, due to the fungous parasite known as *Monilia fructigena*. Last spring it was decided to treat one of these trees with Bordeaux mixture, leaving another standing beside it (unsprayed) as a check. The former was sprayed on June 9, 1898, with Bordeaux mixture, about 2½ gallons being applied to the leaves and young fruit with a knapsack sprayer. The mixture was prepared for the experiment as follows:

6½ pounds of sulphate of copper (bluestone).

3½ pounds of fresh lime.

22 gallons of water.

**Preparation.**—Dissolve the copper in three or four gallons of hot water. Slake the lime and make of it a paste about as thick as cream. Now, stir the lime into the copper solution, and then dilute to 22 gallons of water. The preparation may be applied freely without injuring foliage.

On July 5 the tree was sprayed again, about the same quantity of the mixture being applied. The season was very unfavorable for fruit of all sorts, and neither the sprayed nor the (unsprayed) check tree bore as full crops of fruit as usual. As far as it goes, however, the result is in favor of spraying. Some rotting fruit was



observed at the time of picking on both trees, and a good many plums rotted and fell from both during the summer. On August 22 the plums were gathered.

From the sprayed tree I took 477 plums, weighing  $11\frac{1}{4}$  pounds. These averaged a little smaller than those from the check tree, and the skin showed a peculiar roughness, due either to a caustic action of the mixture, or else is simply a peculiarity of the tree. As the fruit of the trees has not before been compared, it is not safe to decide about this. I have never witnessed any similar effect from spraying grapes and apples, though it may prove that plums are more sensitive to the copper and lime.

The unsprayed check tree yielded 254 plums, weighing six pounds and one-half ounce.

The difference in favor of spraying is thus about  $5\frac{1}{4}$  pounds in the weight of fruit, or, we may say the spraying increased the yield about 48 per cent.

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## PLUM ROT.

BY PROF. F. D. CHESTER, DELAWARE, EXPERIMENT STATION.

Early in spring, and at all times, quickly remove all mummified or decayed fruit and burn it.

Spray strongly with mixture "E," Bordeaux mixture (printed further on), just after the fruit is set, and when it is about half grown; then once every three weeks, to harvesting of the fruit.

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## DESTRUCTION OF LICHENS\* ON FRUIT TREES.

BY PROF. B. F. GALLOWAY, U. S. DEPARTMENT OF AGRICULTURE.

[Report of 1892.]

In many parts of the South it is a common occurrence to various kinds of fruit trees badly infested with lichens. It is a mooted question whether the lichens attack healthy trees and cause them to be less thrifty, or whether the trees are attacked by the lichens because of a weakened condition. Be that as it may, it is certain that badly infested trees are generally weak and sickly and there can be no doubt that it would be advantageous to have these growths destroyed. The lichens not only live on the rough, exfoliating bark of large branches, but on the smooth bark of smaller branches as well. In the latter case it is possible that they take something from the sap of the tree.

While at work in a large pear orchard near Scotland, Va., Mr. Waite, of the department, noticed that many of the trees were literally covered with the plants under consideration. The lichens being so abundant, it was decided to treat the trees in various ways in ridding them of the unsightly growths. Four fungicides were used for the purpose, and, among them, a strong Bordeaux mixture was used as a paint, the trunks and branches being covered by means of a whitewash brush. A few minutes after the lichens were wet they assumed a greenish, ochraceous appearance, quite different from their characteristic gray. The painting was done about the middle of March, and by the end of the first week in April the lichens were dead. In addition to the painting, Bordeaux mixture, half strength, was used as a spray, and whenever the lichens were thoroughly wet with this they were invariably

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\* Commonly called "Rock Moss" and "Tree Moss."

Sprayed.

Unsprayed.



FIG. 11½. EFFECT OF SPRAYING FOR PLUM ROT.

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killed. The experiment showed conclusively that the Bordeaux mixture is an effective destroyer of lichens, and it can be recommended with confidence to those who wish to rid their trees of these growths. It should be applied in early spring, by means of a good force pump provided with a Vermorel or other suitable nozzle. One thorough application will probably be sufficient to kill the lichens, after which they may be easily brushed or scraped from the tree.

## DEPARTMENT OF ENTOMOLOGY.

## THE APPLE CURCULIO, OR FOUR-HUMPED CURCULIO.

BY G. C. BRACKETT, LAWRENCE, KAN.

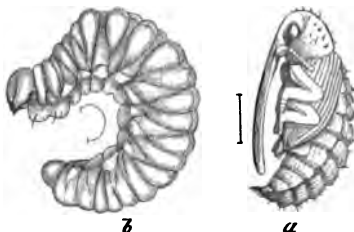


FIG. 12. a, Pupa stage; b, larva, or worm.  
(Hair lines at left of each figure show the natural size.)

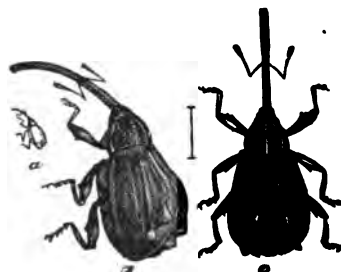


FIG. 13. a, Beetle, natural size; b, same magnified; c, back view of same, magnified.

This insect is readily distinguished by the following characteristics. It is usually of a uniform rusty brown, but occasionally the thorax and front portions of the wing cases are ash gray. Four humps or tubercles are easily seen on the wing cases—two on each case—near the posterior parts. The snout varies in length from half in the male to full length of the body in the female.

With its long, thin snout it drills holes into the fruit, much resembling a puncture by a hot needle, the hole being round, with a more or less intense black annulation, and ash gray center.

Those holes made for food are about one-tenth of an inch deep, and generally scooped out broadly at the bottom in the shape of a gourd. Those which the female makes for her eggs are scooped out still more broadly, and the egg placed at the bottom is often found to be larger than the puncture at the orifice, thus indicating that it swells from absorption by a sort of end osmosis of nutritive fluid from the surrounding fruit.

As soon as the larva worm is hatched, it usually goes to the heart of the fruit and feeds around the core, producing a rust-red excrement. The larva feeds for nearly a month, and when fully grown is about two-fifths of an inch in length, soft and white, curved and transversely wrinkled, and is footless.

As seen in Fig. 12, b, the worm is so hump-backed that it cannot stretch out, but remains curved as shown by the cut, and would make a very sorry figure in attempting to descend the tree. Therefore, as the fruit containing it mostly hangs on the tree, the insect is effectually imprisoned.

Unlike the Plum Curculio, which descends into the ground to transform, the normal habit of our Apple Curculio is to transform within the fruit in which the egg has been deposited. The worm, after being full-fed, settles down in a neat cavity, and soon throws off its skin and assumes the pupa state, when it appears as at a,

Fig. 12. After remaining in this state two or three weeks, it undergoes another moult, and then assumes the beetle or perfect state, as shown in Fig. 13.

We thus see that the Apple Curculio is cradled in the fruit in which it was born till a perfect beetle, fully fledged and ready to carry out the different functions and objects of its life. In other words, it never leaves the fruit after hatching until it has become a perfect beetle.

It passes the winter in the beetle state, and makes its appearance in the spring and commences work of ovipositing in the orchard about June 1, probably without extensive feeding, and continues through July and the latter part of August, when the young beetles issue and soon go into winter quarters.

From a recent letter from Professor Riley, who is chief of the division of entomology, department of agriculture, at Washington, I note the following: "The beak of the beetle is extremely slender, and it is not at all probable that the beetle could receive a poisonous dose of arsenic from spraying, during the process of oviposition; and we have, so far, absolutely no observations which prove a similar feeding habit, prior to oviposition, to that which occurs with the Plum Curculio. It may feed to some slight extent upon the young fruit or tender twigs of the foliage of the haws in the woods, but no one has ever seen it do this in an apple orchard." . . . "It is a question whether the bulk of the damage charged to this insect is really done by it. If investigation should prove that it is partly or largely the work of the Plum Curculio, then arsenical spraying would be useful, as recommended for that insect. If it should prove, however, that it is the Apple Curculio which causes the damage which you describe, the most satisfactory remedy will be to resort to the old jarring process, first used against the Plum Curculio."

From a careful reading of the article treating of this insect, which appeared in the *Capital* of January 26, the difficulty in controlling it with the present knowledge of its life's habits is apparent, and yet the necessity of checking its ravages of the apple and pear crops cannot be overestimated. Thousands of dollars' worth of these fruits go to the ground as a waste product, and to the cider mills each season, which, if not injured by the Apple Curculio, would heavily increase the bulk of first-class commercial product.

Most of our entomological writers and scientists, until quite recently, have held to the belief that the Plum Curculio could be successfully combated only by capture of the beetle. When it was suggested that spraying the young fruit with Paris green might cause its death by poisoning, there was much incredulity among practical men, and when faith in the remedy was established, the means was found to be only partially effective, for the reason that the poison must be taken into the stomach to become in any degree fatal. Such chances did not afford a wide field for attack, being limited to the act of the beetle in puncturing the fruit for food and the process of cutting the skin—the crescent around the puncture in which to deposit its eggs. When it is known that the snout with which the punctures for either purpose are made is very small and delicate, and the operation of sucking only occurs when it is inserted into the body of the fruit for food, it is clearly seen that the chances of death through such means are not highly encouraging. Hence the frequent complaint that the spraying process is not successful.

Prior to about 1883, no further knowledge of the feeding habits of the Plum Curculio existed, and it was then that Professor Motherall, entomologist for the California state board of horticulture, knowing that the beetle emerges from the ground in the fall and spends the balance of its life above ground, and must subsist on some class of vegetation until the period for procreating its species in the spring, discovered and established the fact beyond question, that the beetle of the Plum

Curculio forages on the tender bark, buds, flowers and young leaves, before the young fruit has attained to proper size to furnish food or a receptacle for its eggs.

This discovery disclosed a vulnerable period in the life of this insect, and during which spraying with arsenical poisons could be more economically and effectually applied, and that such treatment should commence before the blooming period and continue at intervals thereafter.

Professor Motherall, in conclusion, says: "Being in possession of this discovery, by a judicious and timely appliance of the simple and comparatively inexpensive means of spraying the fruit of the plum and such other classes of fruit, as peaches pears, and cherries, as are attacked by this insect, a crop may be assured in such regions as are adapted to their culture."

Until quite recently no method was known for the suppression of the Codlin Moth apple worm, other than the capture of the worm with traps constructed of rags, paper or boards and the hand picking of infested fruit from the tree, or after fallen to the ground. Now we have the more simple and effective means of spraying with arsenical poisons—London purple and Paris green. The necessity for the protection of our apple crop from the great damage done by the Apple Curculio is as important to the interests of the orchardist as that of either of the insects mentioned, as the extent of the injury threatens a greater loss in the aggregate at the present time than from the attacks of any other species known to the culturist. Its prevalence may not, at present, be general over our state, but, like the Codlin Moth, it is only a question of time as to its becoming so.

The main question to be solved, as with the Plum Curculio, is to determine the most vulnerable period in its life for attack. It is reasonable to conclude that it must find some means for subsistence during the period from the latter part of August—the time that it emerges from the chrysalid state into the beetle—until the time of placing its eggs in the fruit, June 1, the following year, and if by observation it should be found that it forages in the orchard, the means for its suppression are at hand, and, by due application, can be made effectual. As admitted in Professor Riley's letter above referred to, "it may feed, to some slight extent, upon the young fruit or tender twigs of the foliage of the haws in the woods."

As the haw belongs to the same family and order as the pear, and as it has unquestionably extended its breeding quarters from the "haw of the woods" into the apple orchard, it may have also changed its foraging to the apple tree. It is well known that some species of insects have made changes of a like nature, both as to foraging and breeding. For instance: The apple worm (Codlin Moth) formerly was confined to the apple, but of recent years it infests other fruits; and the same change occurs with the Plum Curculio.

Professor Bruner, entomologist for Nebraska, in a recent letter, says: "The Apple Curculio also occurs upon our wild or crab apples. It must have similar habits to those of the Plum Curculio and the Plum Gouger. It certainly feeds upon the tissues of the plants; and this being the case, it can, very likely, be fought, to some extent at least, by the arsenical sprays."

It is hardly probable that these beetles migrate from the woods into our apple orchards in such numbers as would be required to do the extent of work apparent to any observer, and especially into prairie orchards located one to five miles distant from any wood; and furthermore, the haw is not common in Kansas woods. From my own observations, I am led to believe that they are not only present but are prevalent in our orchards at all times, and do make such their abiding place. I have found them upon the foliage in early spring and late autumn, and I am yet to be convinced that after breeding in our apples they "take to the woods" simply to hibernate, and return at the opening of spring, when the orchard grounds would

furnish equally as good quarters for a winter home; and that the spraying with arsenical poisons can be made effective for the protection of our crops, if vigorously applied as soon as the buds begin to swell, and followed up at intervals after the leaves have formed.

The statement of our most extensive orchardist (Judge Wellhouse) that he had noticed a reduction of injury by this insect since he had adopted spraying his orchards for the suppression of Codlin Moth, sustains the method recommended, and in which Professor Bruner has faith of successful results.

### THE PLUM CURCULIO (*Conotrachelus nenuphar*).

[Description by Cyrus Thomas, State Entomologist of Illinois; Sixth Illinois Report, pp. 137-141.]

This insect is undoubtedly one of the most destructive and difficult insects which the orchardist has to contend with. It yet remains master of the situation, although every part of its history, from the egg to the beetle, has been carefully studied, and horticulturists have tried every mode of defense and attack which ingenuity has so far been able to devise. The beetle (c, in Fig. 14) is of a dark-brown color, variegated with spots of white, ocher yellow, and black. The wing cases have two shining black "humps" or tubercles on them—one on each case, about the middle; behind these is a broad band of dull yellow and white. It varies in length from a little over one-eighth to one-fifth of an inch. When disturbed, it has a habit of drawing up its legs and bending its snout under its breast, when it is easily mistaken for a knot or wart on a limb or a fragment of bark.

The beetles usually come forth from their winter quarters in May and June.\* The female, when about to deposit her eggs, makes a minute cut with the jaws at the tip of her snout, and then, thrusting her snout into the cut, enlarges it sufficiently for the reception of an egg; turning around, she drops an egg into the opening, which she afterwards thrusts to the bottom of the cut with her snout. Then she cuts the crescent mark around one side of the orifice, as seen at d in the figure. One egg only is deposited in an opening, and is of a pearly-white color. Each female is supposed to have a stock of from 50 to 100 eggs, and to deposit from 5 to 10 a day. While those which appear earliest begin this work about the middle of May, it is continued by others which appear later, until the last of June or 1st of July, thus extending the period of egg depositing to about two months.

The larva (a, in the figure) which is hatched from the egg is a little footless worm, somewhat maggot-like, and is of a glassy, yellowish-white color, but partakes more or less of the color of the flesh of the fruit in which it resides. When full-grown, it is about two-fifths of an inch long. The fruit containing this grub does not usually mature, but falls to the ground before it is fully ripe, and before the

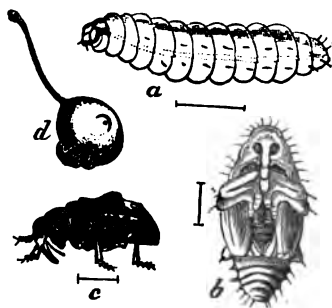


FIG. 14. a represents the worm; b, the pupa; c, the perfect beetle; d, a plum, showing the puncture made in depositing the egg, and the crescent cut. The hair lines just below a and c, and to the left side of b, indicate the natural size.

\*Recent investigations by Professor Motherell, entomologist for California, establish the fact that the beetle emerges from the ground in the fall and hibernates in rubbish and covert places, and feeds upon the buds, flowers and young bark of trees in early spring.—SECRETARY.



grub is quite full-grown. When it has completed this stage, it leaves the fruit, now on the ground, and burrows a few inches into the earth, where it passes into the pupa state. This requires about three weeks, when it comes forth in the beetle form (c, in figure). As is well known, it attacks plums, nectarines, apricots, cherries, peaches, apples, pears, and quinces; but it does not so readily mature in the apple, as this fruit appears to be too juicy for it. Usually the fruit in which it resides drops to the ground before maturity, but the cherry appears to be an exception to this rule.

#### REMEDIES.

When alarmed, the beetle folds up its legs close to its body, bends its snout under its breast, and drops to the ground. This habit has suggested jarring the trees, and thus causing them to fall into a sheet or other contrivance for securing and destroying them, which is the most efficient remedy against them so far known. A number of orchardists, under the mistaken idea that the beetle had necessarily to climb the trees, have applied bandages as traps.

[This is useless, as the beetle readily flies from tree to tree. Smudging the fruit with coal-tar smoke, to be repeated immediately after every rain, is claimed to be an effectual protection. This is easily and rapidly done. Take a pan of live coals, and put on them a quantity of coal tar. This will produce a dense smoke, which is easily scattered through the tree. The recent discoveries of the uses of some insecticides may eventually lead to some means of successfully suppressing the curculio.—SECRETARY.]

[The following notes are taken from the Ohio Agricultural Experiment Station bulletins, and are reported by Prof. J. W. Green.]

#### SPRAYING THE PLUM.

The most troublesome insect affecting this fruit is the Plum Curculio. It has been repeatedly affirmed in bulletins published by this station, that the curculio can be controlled by spraying three or four times during the season with Paris green, and later experiments confirm these statements. A practical difficulty exists, however, in the fact that, no matter how dilute the mixture, there is danger of injuring the foliage. This is due for the most part to the fact that the foliage of plum trees is seldom free from the disease commonly known as the shot-hole fungus, a name descriptive of a disease which causes the leaves to drop prematurely. This early dropping of the leaves injures the trees, and prevents the proper development and ripening of the fruit. It becomes a necessity, therefore, to treat the foliage for the disease, whether the curculios are caught by jarring, or poisoned with Paris green, and particularly if the latter method is followed.

It follows, then, that the best mixture to use on plums is a combination containing a fungicide and insecticide. This course was advised in the December bulletin of 1891, and further trial confirms the statements there made. Even those who hesitate to use Paris green admit the efficacy of the dilute Bordeaux mixture, and those who have fully tested both agree that the combination is entirely satisfactory. The formula for dilute Bordeaux mixture is:

4 pounds sulphate of copper.  
4 pounds quicklime.  
50 gallons of water.

Dissolve the copper sulphate in two gallons of hot water, and pour into the barrel or tank used in spraying, after which fill the tank nearly half full of cold water. Slake the lime in another vessel, and pour into the sulphate or copper solution, through a brass wire strainer having about 30 meshes to the inch. The lime will not dissolve readily; hence after each time more water is to be added to the lime, and

poured off as before, until nearly all the lime is dissolved or taken up in suspension, which is really the case. Water to make 40 to 50 gallons in all is then to be added. To this add two ounces of Paris green or London purple. This mixture is to be applied to the tree with a suitable force pump as soon as the blossoms have fallen, and repeated three or four times, at intervals of one week. There does not seem to be any necessity for more than four applications, and three have been found to answer very well.

#### RESULTS OF SPRAYING THE PLUM.

Mr. G. B. Strong, of Cuyahoga, Ohio, sprayed 40 trees with London purple, at the rate of 1 pound to 150 gallons of water. Three applications were made, the first one being applied when the fruit was about the size of a small pea. The spray was put on until the leaves began to drip. Twenty bushels of plums were gathered from the 40 trees, and not 1 per cent. of the crop was stung by the Curculio. The foliage was injured somewhat, so that Mr. Strong says the solution was too strong, and that hereafter he will use 1 pound of London purple to 200 gallons of water, spraying more lightly and applying only twice, unless a third application becomes necessary.

It is probable that Paris green would be better for spraying plum trees than London purple, as it usually contains less soluble arsenic, and, consequently, is less liable to injure delicate foliage. It may be used at the rate of 3 ounces to 50 gallons of water.

Mr. Wm. Miller, a leading fruit grower of Ottawa county, Ohio, has two pear orchards, several rods apart, the fruit of which has for some years been greatly injured by the Plum Curculio. He determined to try spraying one of them. The larger orchard, containing several hundred trees, was accordingly sprayed twice with London purple—4 ounces to 50 gallons of water. The fruit on this orchard was very much less injured by the curculio and other insects than that on the other orchard, which had not been sprayed.

[The following is a letter recently received from Professor Green, in answer to inquiries from this office.—SECRETARY.]

G. C. Brackett:

WOOSTER, OHIO, January 30, 1894.

DEAR SIR—Yours of January 25, relating your experience in spraying for the Plum Curculio, is at hand. Our experience in keeping the curculio in check has been uniformly successful in orchards, but not when a tree or two were sprayed. We have found the difficulty in keeping the curculio in check to increase as the number of the trees is diminished. Hence, spraying with Paris green is not a thoroughly practical method in all cases. As applied to orchards, we still claim that it is the best method. We find, however, that it pays to keep a close watch on the "Little Turk" and to spray when he is most active. It often happens that he will work but little for a number of days, owing to unfavorable weather, and then, when the weather changes, will do as much in one day as in a week previous. To combat him successfully, his habits must be studied. To spray at stated intervals without regard to what the curculio is doing often results in failure, whereas, a dose at the proper time would have accomplished something.

We now advocate an occasional jarring, so as to save all plums that may be stung, in order that they may be burned. We also use the Paris green in combination with Bordeaux mixture, in order to prevent premature falling of the leaves, which often occurs. We seldom find that more than four applications are required, but it is hardly possible to lay down a rule, as the treatment must be varied to suit the circumstances. The experience of numerous orchardists in the state corroborates these statements.

Yours truly, W. J. GREEN.

### THE CODLIN MOTH, OR APPLE WORM (*Carpocapsa pomonella*).

[Extracts from First Missouri Report, pp. 62-67, by Prof. C. V. Riley.]

"The accompanying illustration represents it in all its states, and gives at a glance its natural history: *a* represents a section of an apple which has been attacked by this worm, showing the burrowings, and channel of exit to the left; *b*, the point at which the egg was laid, and at which the young worm entered; *c*, the full-grown worm; *d*, its head and first segment, magnified; *e*, the cocoon which it spins; *f*, the chrysalis to which it changes; *g*, the moth which escapes from the chrysalis, as it appears when at rest; *h*, the moth with wings expanded.

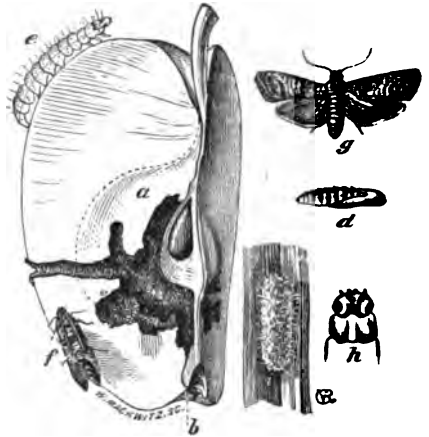


FIG. 15.

"The worm when young is whitish, with usually an entirely black head, and a black shield on top of the first segment. When full-grown it acquires a flesh-colored or pinkish tint, especially on the back, and the head and top of first segment become more brown, being usually marked as at Fig. 15, *h*. The cocoon is invariably of a pure white color on the inside, but is disguised on the outside by being covered with minute fragments of whatever substance the worm happens to spin to. The chrysalis is a yellowish brown, with rows of minute teeth on its back, by the aid of which it is enabled to partly push itself out of its cocoon, when its time to issue as a moth arrives. The moth is a beautiful object; its fore wings are marked with alternate, irregular transverse wavy streaks of ash gray and brown, and have on the inner hind angle a large tawny spot, with streaks of a bright bronze color of gold.\*

"The first worms begin to leave the apple from the 5th to the 10th of June, and become moths by the fore part of July. While some of the first worms are leaving the apples, others are but just hatched from later deposited eggs, and thus the two broods run into each other; but the second brood of worms (the progeny of the moths which hatch out after the first of July) invariably pass the winter in the worm (or larva) state, either within the apple after it is plucked, or within the cocoon. I have had them spin up as early as the latter part of August, and at different dates subsequently till the middle of November, and in every instance, whether they spun up early or late in the year, they remained in the larva state till the middle of April, when they all changed to chrysalids within a few days of each other. Though the Codlin Moth prefers the apple to the pear, it nevertheless breeds freely in the pear. It also inhabits the fruit of the crab apple and quince, and has been reported as breeding in the sweetish pulp of a species of screw bean, which grows in pods; also in plums and peaches. As a general rule there is but a single worm in each apple, but two are sometimes found in one and the same fruit. The eggs require from 4 to 10 days to hatch. The worm exists in larval state 25 to 30 days, and in the pupa state 12 to 18 days."

The enemy of our fruits was not as numerous in 1893, as is evidenced by reports to the Secretary's office. The very light crop of apples, it is true, was infested in

\* The moth appears in Kansas generally with the first warm days of March and April.—SECRETARY.

most of the localities where the insect was prevalent in past years, and which some reporters claim as evidence of being as numerous, and yet such reporters admit that the apple crop was *very* light—almost a total failure. Others claim that their comparative numbers could not be satisfactorily decided because of the very great scarcity of fruit. Among the fruit grown in my own orchards, where spraying had been thoroughly and carefully applied, it was difficult to find a specimen of this insect.

It is no longer a question in doubt as to the great benefits which result from spraying our orchards with insecticides, and as to the profits in a commercial estimate there is an abundance of testimony of a reliable character, not only in other states, but fully so in our own.

On this point I quote Professor Riley, of the department of agriculture, to the Maryland agricultural experiment station:

"As some of our orchardists may yet fancy that the time and means required to spray effectively are wasted, let me quote a single instance of the value of spraying, from a correspondent in the vicinity who is an extensive grower, and then give some of the best and latest methods. Two years ago Mr. John S. Lupton, of Winchester, Va., wrote me as follows:

"I have a fine young apple orchard of fifty acres, all Newtown Pippins, immediately adjoining which on the north is an older and much neglected orchard belonging to a neighbor. The old orchard has been badly infested with worms for many years, and until the present season the north half of my orchard has been practically worthless, the trees shedding most of their fruit in May and early part of June, those which remained being so wormy as to be largely unfit for market, while the south half has borne fair crops, comparatively free from worms.

"Soil, drainage and other conditions being similar throughout, I am constrained to the belief that the near proximity of the old and worm-infested trees to the north side of my orchard is the cause of the difference above noted. Acting upon information obtained from one of your pamphlets, I bought, last spring, a full spraying outfit, using the Climax preparation of London purple.

"Soon after the blossoms fell, I began spraying on the side nearest the old adjoining orchard, the machine working perfectly, the Climax nozzle breaking up the solution in a fine mist which completely enveloped the trees.

"After working a day and a half and applying the poison to about one-third of the trees, I suspended operations on account of the weather becoming so windy as to make the work exceedingly disagreeable, one of the men having been made sick by the poison blown into his face.

"Influenced somewhat by the skepticism of my neighbors, most of whom regarded the experiment dangerous, and confessing to no small lack of faith myself, I regret to say that I allowed other farm work to interfere, and never finished the work of spraying.

"With the mental reservation that should the heretofore barren north side, where the poison had been applied, do as well as the south half, I would spray more thoroughly next year, I waited the outcome with an indifference born of unbelief. Please note the result. From the sprayed trees—not quite one-third the whole number—I gathered 1,000 barrels of A No. 1, merchantable fruit, so entirely free from worms that sorting was almost unnecessary, while the remaining two-thirds of the orchard (unsprayed) yielded 883 barrels of good fruit, quite one-fifth of the apples on the unsprayed trees being wormy and unfit for sale. The market price of apples in this locality the past season was from 60 to 75 cents per barrel, one or two choice lots of Ben Davis and York Imperial bringing \$1 per barrel, while my fruit sold in the orchard nearly a month before picking at \$2.55 per barrel.

"I estimate the cost of failure to spray the whole orchard at \$2,500; but con-

sider the lesson cheap at the price, as I will never have it to learn again, and feel confident that with ordinary care no harmful results will follow spraying.'"

#### THE USE OF ARSENICAL SPRAYERS.

By Prof. C. V. Riley, Department of Agriculture. (His latest report.)

*Substances to be Used.*—Two arsenical poisons are commonly used in spraying orchard trees for the Codlin Moth, namely, Paris green and London purple. Of the two, Paris green still holds the vantage ground by virtue of the fact that it is insoluble in cold water and contains a more constant proportion of arsenic. London purple, on the other hand, is somewhat cheaper; and the slightly purplish hue which it imparts to the treated foliage possesses some value, as indicating more clearly the efficacy of the spraying, for it permits us to see whether or not the application has been uniformly made, and has taken a firm and uniform place upon the leaves, which the Paris green does not show to the same extent.

The slight solubility of the purple in cold water renders it more apt to burn the foliage, but this difficulty is easily overcome by the addition of a small quantity of lime water to the mixture, thus transforming the soluble arsenic into an insoluble substance.

The use of ordinary white arsenic is not advised, because of its insolubility and its color, which renders it indistinguishable from some harmless substances, for which it is apt to be mistaken, so that it is more dangerous to have about the farm in quantities.

Either London purple or Paris green, then, should be thoroughly mixed with water, in the proportion of one pound of the poison to 150 gallons of water, and this mixture should be thrown in a fine spray through the trees, so as to thoroughly moisten all parts of the leaves and fruit. I cannot too strongly urge the advantage of careful spraying, which shall cause a uniform fall in the form of a mist, and not drench the tree, by which the poison will become concentrated in particular spots and injure those parts. The first application should be made about a week after the blossoms fall and before any of the larvæ (worms) have hatched or entered the fruit, as the efficacy of the spraying depends upon the worms taking a small quantity of the poison with their first meal in eating through the calyx of the young apple. Unless a heavy fall of rain should follow this first application, the spraying will not have to be repeated. A small quantity of flour or starch mixed at the time of stirring Paris green in the water, will tend to make the spray adhere better and more uniformly, but these sticky substances should not be mixed with London purple, as they precipitate the poison, and rather increase the inequality of its distribution.

One great advantage of such spraying is, that in addition to greatly lessening, if not practically checking, the work of the Codlin Moth, it also destroys a great number of insects which feed upon the leaves of the apple tree, and will in a measure also serve as a protection against certain fungous diseases. Where orchards are seriously affected with rust or scab, it is desirable even to combine with the arsenical spray a certain amount of Bordeaux mixture; and a good formula for this last is, seven pounds of unslaked lime, six pounds of copper sulphate (or bluestone), one-half pound of London purple, and 75 gallons of water.\*

*Apparatus for Spraying.*—For orchard use, the knapsack pumps or bucket pumps are practically unavailable, however useful for a few trees by means of ladders.

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\*By thus combining the fungicide, Bordeaux mixture, with the insecticide, London purple, a single spraying will answer for both fungi and insects which may be present, and much time will be saved thereby.

A good, strong double-acting force pump should be purchased and mounted on a large, stout barrel, with the supply tube reaching well down to the bottom.

It has become the custom to mount the pump in the end of the barrel, but, except in the case of the Nixon tripod, it will be almost as easy to mount it on the side of the barrel, which is easily held in place by a skid near each end, and is then more compact and stable than when standing on the end. While the handle of the pump comes lower and is more easily worked. It will be well to buy the pump without attachments. About 25 feet of one-fourth inch cloth insertion rubber tubing is attached to the discharge orifice, or to each of the orifices, in case there are two. To the end of the tube is fitted one of the modified Cyclone or Riley nozzles, and the outer 8 or 10 feet are clamped or wired to a light pole or bamboo fishing rod, for convenience in elevating the nozzle into large trees. The barrel is mounted on a cart or sled and driven between the tree rows, one man driving and pumping and the other holding and directing the extension pole and nozzle.

I have mentioned the Cyclone nozzle for the reason that, all things considered, I believe it, in some of its modifications, to be the best for orchard work. The Climax nozzle is also a good one, but it is rather large and clumsy, its spray hardly so fine, and it will not answer for fungicides containing lime, since it clogs easily. The Vermorel modification of the Cyclone nozzle possesses a little attachment which quickly unclogs the orifice when once stopped up, and is therefore preferable. Moreover, neither the Cyclone nor Vermorel modification is patented, which, other things being equal, is in their favor."

#### THE TARNISHED PLANT BUG (*Capsus oblineatus*).

[NOTE.—This insect has for some years been quite damaging to the crops of apples, pears, quinces, and especially to raspberries and strawberries,\* and their injury has sometimes been charged to frosts and insufficient fertilization of the blossoms.

Strawberry beds, with the leaves matted along the rows and the usual mulching required for a winter protection of the plants, furnish fine hiding places for the bugs during winter, and from which they swarm in spring with the first warm days, and attack the flower clusters for their food. Its great prevalence in 1893, and the evident lack of knowledge among some growers of the causes of injury complained of to this office during the season, are the reasons for presenting its life history and recommendation of means for its suppression at this time.—SECRETARY.]

The following is a description from Prof. C. V. Riley's second Missouri report, pp. 113-115:

"This figure (No. 16) represents this bug in a greatly-enlarged form, the hair line at the left indicating its natural size. This bug is a very variable species, the males being generally much darker than the females. The more common color of this bug is a dull yellow, approaching to a light russet or brown, and frequently inclines to an olive green, variegated, as in the figure given, with black and dark brown, and one of the most characteristic marks is a yellow V, sometimes looking more like a Y, or indicated by three simple dots on the scutellum (the little triangular piece on the middle of the back, behind the thorax). The thorax, which is finely punc-



FIG. 16.

\*Has recently been quite damaging to celery in the Kalamazoo district, in Michigan.—SECRETARY.

tured, is finely bordered and divided down the middle with yellow, and each of the divisions contains two broader, longitudinal yellow lines, very frequently obsolete behind. The thighs always have two dark bands or rings near their tips. This plant bug is a very general feeder, attacking very many kinds of herbaceous plants, such as dahlias, asters, marigolds, balsams, cabbages, potatoes, turnips, etc. Its puncture seems to have a peculiarly poisonous effect, on which account, and from its great numbers, it often proves a really formidable foe. It is especially hard on young pear and quince trees, causing the tender leaves and the young shoots and twigs to turn black, as though they had been burned by fire. On old trees it is not so common, though it frequently congregates on such as are in bearing, and causes the young fruit to wither and drop.

"As soon as vegetation starts in the spring, the mature bugs, which winter over in all manner of sheltered places, may be seen collecting on the various plants which have been mentioned. Early in the morning they may be found buried between the expanding leaves and at this time they are sluggish, and may be shaken down and destroyed; but as soon as the sun gets warmer they become more active, and, when approached, dodge from one side of the plant to the other, or else take wing and fly away. They deposit their eggs and breed on the plants, and the young and old bugs together may be noticed through most of the summer months. The young bugs are perfectly green, but in other respects do not differ from their parents except in lacking wings. They hide between the flower petals, stems and leaves of different plants, and are not easily detected. Late in the fall, none but full-grown and winged bugs are to be met with, but whether one or two generations are produced during the season has not been fully ascertained, although in all probability there are two.

#### REMEDIES.

"In the great majority of cases we are enabled to counteract the injurious work of noxious insects the moment we thoroughly comprehend their habits and peculiarities, but there are a few which almost defy our efforts. The Tarnished Plant Bug belongs to this class, for we are almost powerless before it, from the fact that it breeds and abounds on such a great variety of plants and weeds, and that it flies so readily from one to the other. Its flight, however, is limited, and there can be no better protective treatment than clean culture; for the principal damage is occasioned by the old bugs when they leave their winter quarters and congregate on the tender buds and leaves of young fruit stock; and the fewer weeds there are to nourish them during the summer and protect them during the winter, the fewer bugs there will be. The small birds must also be protected.

"Applications of air-slaked lime and sulphur have been recommended to keep them off; but any application of this kind used, to be effectual, I incline to think should be of a fluid nature; and strong tobacco water, quassia water, vinegar and cresylic soap I would recommend. Some persons who have used the latter compound have complained that it injures the plants. Every one using it should bear in mind that the pure cresylic acid, no matter how much diluted with water, will separate when sprinkled, and burn holes in and discolor plant texture; while, if properly used as a saponaceous (soapy) wash, it will have no injurious effect. It must likewise be borne in mind that the so-called 'plant protector,' which is a soap made of this same (cresylic) acid, will bear very much diluting (say one part of the soap to 50 or even 100 parts of water), and that it will injure tender-leaved plants if used too strong. I have noticed that the bugs are extremely fond of congregating upon the bright yellow flowers of the cabbage, which as every one knows blooms very early in the season; and it would be advisable for persons who have been seriously troubled with



this bug, and who live in a sufficiently southern latitude, where the plant will not winterkill, to let a patch of cabbages run wild and go to seed in some remote corner of the farm, in order that the bugs may be attracted thither and more readily destroyed than when scattered over a large area."

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STRAWBERRY WEEVIL (*Anthonomus musculus* Say).  
(*Anthonomus signatus* Riley.)

[Bulletin No. 18, Delaware Agricultural Experiment Station.]

On May 11, 1892, we received a letter from Mr. W. F. McKee, a farmer and fruit grower residing near Dover, Del., in which he says:

"A small black beetle is injuring our strawberries. They are very hard to get hold of; as soon as you come near they jump or fly. They are so small that they can hardly be seen by the naked eye. My attention was called to it only two days ago. Since then, I have seen seven or eight different patches, all badly injured. They attack the fruit buds as soon as they push up, and before they are in bloom. They also work upon the blossoms that are out. The strangest thing is, that the insects are working almost entirely upon the varieties with perfect blossoms. The Bubach, Eureka and Haverland are scarcely touched as yet, but Jessie, May King, Wilson and Sharpless are almost denuded of blossom buds. They eat or sting the stems about one-half an inch below the buds, which soon die, and nearly all drop off."

We visited Mr. McKee's place on May 12, and found that about three-fourths of the blossoms of the perfect-flowering varieties of strawberries had been destroyed, but only a very few of the insects could then be found upon the plants. We also visited several other plantations, one of which where probably one-third of the buds had been destroyed, and others where the damage was slight. At one farm we found the weevil present in considerable numbers on May 25, and a large proportion of the blossoms had been injured. There we found the insects feeding upon the blossoms, and in many of the injured blooms small, light-colored worms were found burrowing into the ovary of the blossom. A considerable number of the infested blossoms were procured and placed in a breeding cage. The larvæ (worms) changed to pupæ within the infested blossoms, and the perfect insect (beetle) began to emerge from them on June 10. The stems of the blossoms infested with the larvæ did not appear to have been injured by the insect. The stamens of the blossoms had been destroyed, and the ovary or center of the blossom, in which the larva was at work, had turned black, from which fact the infested blossoms were readily discerned. . . . From the fact that the first brood of the insects issued early in June, it seems probable that there are two and possibly three broods during the season. Upon what other plants the later broods feed, and how the insects hibernate, are questions that remain to be solved.

In all the previous appearances of this insect, they seem to disappear and have not proved injurious after the second season; and it is very probable that they will cause an increased amount of damage during the coming season, after which they will again disappear.

REMEDIES.

Until we have had an opportunity to test remedies for this insect, and without a full knowledge of its life history, we can only give some suggestions in regard to the best methods of combatting these beetles. Whatever remedy is used must be thoroughly applied early in the season, as soon as the blossom has begun to appear.



## KEROSENE EMULSION.

The frequent use of kerosene emulsion upon the plants, making the first application at the first appearance of the buds, or even before they appear, will probably prevent an attack of the beetles.\*

## WHITE HELLEBORE.

We would also advise the use of white hellebore upon the plants, the same as is used upon currant bushes to destroy the currant worms. It is perfectly harmless to mankind. This should be applied with water, as follows:

White hellebore, 1 ounce.  
Common glue, 1 ounce.  
Water, 3 gallons.

Either of the above remedies can be sprayed upon the plants by means of one of the spraying pumps that are manufactured for that purpose.

## SUMMARY.

1. The Strawberry Weevil attacks the strawberry as soon as the buds begin to appear in the spring.

2. The weevil first attacks and works almost exclusively upon the buds and blossoms of the perfect-flowering varieties.

3. The larva (worm) of the beetle penetrates the center of the blossom (the ovary or rudimentary berry), thereby blasting the blossom, and remains there until it emerges as a perfect beetle.

[NOTE.—This weevil is evidently in Kansas. The indications of its presence were discovered in the spring of 1893, upon the Michel strawberry. The appearance of its work, without a careful examination, might be mistaken for the injury of a late spring frost or failure in fertilization. How long it has been present, there is no way of determining, only by the knowledge obtained from similar indications occurring in past years. It is no new insect only as regards locality. Mr. Glover found it injuring strawberry plants in 1871 in Maryland; Professor Riley discovered it in 1873 in Missouri; Professor Cook reported it ruining a strawberry crop in Michigan in 1883, and it was very damaging at Staten Island, N. Y., in 1884 and 1885. There are reasons for believing that the blasted condition of the blossom buds seen some seasons is due largely to the injury done by this weevil, and not so much as has been claimed to late frosts or lack of sufficient pollination, and that by the use of efficient remedies the productiveness of some varieties may be satisfactorily increased. It will be well for strawberry growers to give this matter a careful examination upon their own plantations.—SECRETARY.]

## SPRAYING.

BY G. C. BRACKETT, LAWRENCE, KAN.

The present era in fruit culture demands special attention to means for suppressing injurious insects and fungous organisms. Why these natural enemies to some of the chosen industries of man were created is not the question confronting us. We know that they do exist, and we are made to feel the force of their struggle for an existence in depleted and injured product. It has been determined by scientific

\*For a formula for kerosene emulsion, see p. 128 of this volume.

and practical experiment that certain chemicals in solution, applied to trees, plants and fruit in the form of a spray, are the most reliable and safest method for combating these evils.

The best materials to be used, proper proportions to render them safe against injury to the plant, their hygienic influence upon mankind and the best method of applying have engaged the most scrutinizing attention, care and persistent investigation, both in the laboratory and field, and the results show conclusively that present adopted methods are reliable, and the subterfuge advocated by a very few persons, that nature will control and afford relief, is baneful and deluding.

Spraying has come to stay with progressive, intelligent and prosperous culturists, and it is only a matter of time when a spraying machine will be regarded as necessary an implement to the horticulturist as the plow, hoe, or spade.

#### IMPLEMENTS.

In this work the first point in importance to be considered is the best means of applying the spray; and, first, some kind of a force pump is required, and of such make as will throw the liquid preparation to all points needed, even to the topmost parts of the tallest trees. This is especially necessary where the destruction of noxious insects is intended.

There are many forms of pumps manufactured for use in the make-up of a sprayer. Some are offered for their cheapness in cost; some for greater efficiency in service; and others for their greater durability. But a pump which combines all these points is the cheapest in the end. Therefore, I would urge a selection of one complete in all its parts as the most economical in purchase.

For small plantations the "Knapsack" sprayer will be found the most convenient and useful. There are several kinds of these manufactured. Some are cheaper than others, owing to the difference in character and quality of the material used and their equipment.

Fig. 17, represents the improved Galloway knapsack sprayer. This is one of the best for use in spraying small fruits and vineyards, and can be used to advantage on trees which are inconveniently located to be reached with the barrel or horse-power machine. Cost at the factory, complete, \$14.

Fig. 18 is a cheap but effective force pump. Cost, complete, \$12.

The Ideal, Fig. 19, is claimed to be the easiest-working spray pump ever put on the market. It is *actually* double acting, furnishing a constant stream while being worked. It can be attached to a barrel end or its side. Cost, with five feet of hose and a spray nozzle, without barrel, \$14.50.

Fig. 20 illustrates an implement mounted on a hand cart, and, for general purposes, is the most convenient of all hand-power machines. Cost, without barrel, \$15; cost, complete, \$18.

Fig. 21 illustrates the Wellhouse sprayer, a horse-power machine, having the greatest capacity, efficiency and ease in working of any machine made. Its cost (\$75) is the only objection with small planters. But this may be alleviated by sev-



FIG. 17.



FIG. 18. IMPROVED FORCE PUMP.



FIG. 19. "IDEAL" SPRAYER.

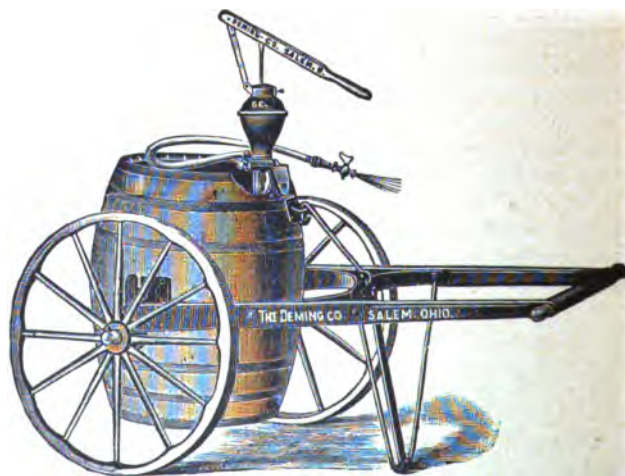


FIG. 20. HAND-CART SPRAYER.

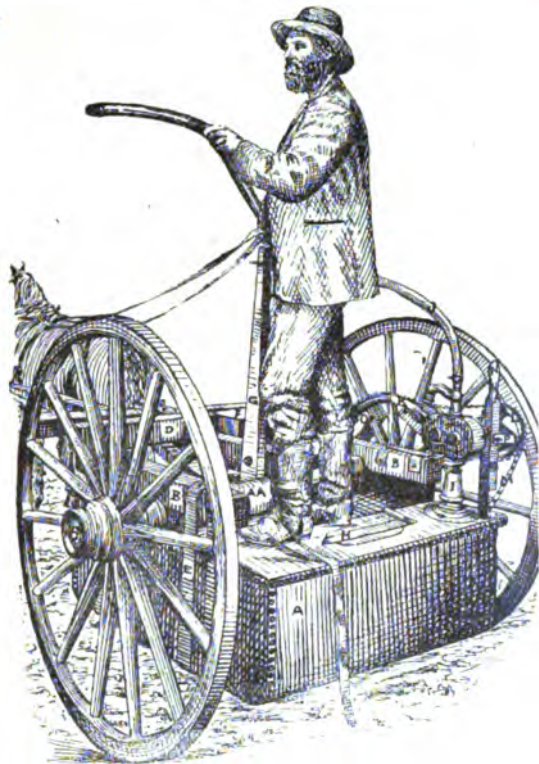


FIG. 21. WELLHOUSE SPRAYER.



FIG. 22. WELLHOUSE NOZZLE—In parts.

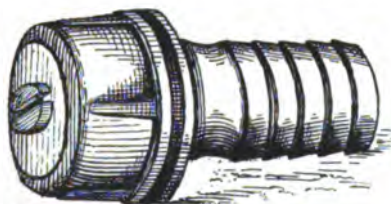


FIG. 23. WELLHOUSE NOZZLE—Ready for use.

eral planters in a neighborhood combining in its purchase and use. By so doing, the cost to each may be reduced to a sum below any of the other machines in the market. This machine may be made by any ordinary carpenter. For the construction of this machine, full instructions can be obtained from the Secretary of the State Horticultural Society. No patent right attaches, it being the invention of Messrs. Wellhouse & Son, Fairmount, Kas., and by them donated to the fruit growers of the state. The nozzle used with this machine is the cheapest, simplest and most efficient for orchard spraying of any known. It needs no repairing, and, whenever it becomes clogged up, can be taken apart by hand and, while on the machine, cleaned and adjusted in a minute of time. Fig. 22 exposes the nozzle in parts. Fig. 23 shows it when put together and ready for use. These nozzles need not cost 10 cents each.

#### EXCELSIOR SPRAYING MACHINES.

*Outfit No. 1.*—Knapsack capacity, five gallons (Fig. 24). The pump, being made entirely of brass and copper, can neither rust nor corrode.

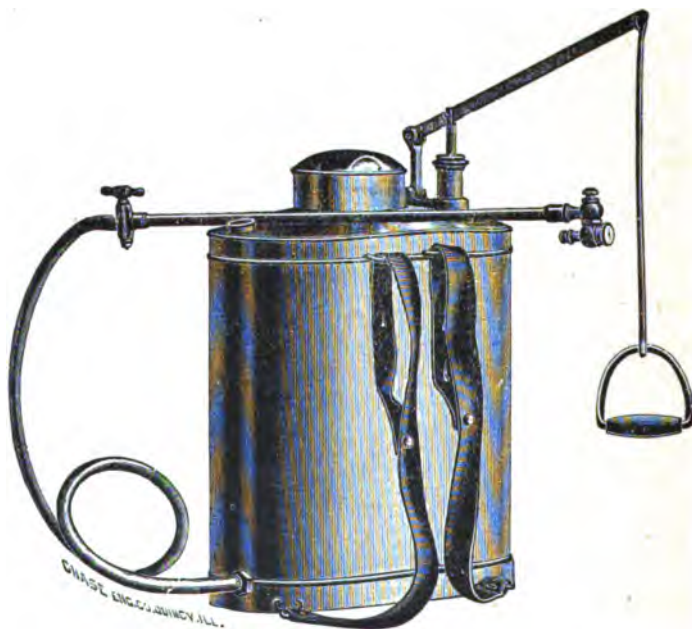


FIG. 24. KNAPSACK SPRAYER. (Excelsior outfit.)

It is carried on one's back, knapsack fashion. From five to six acres can be sprayed with it in a day. It is guaranteed to do satisfactory work or the purchase money will be refunded.

Price, with necessary equipment, including the Vermorel nozzle, \$12.

*Outfit No. 4.*—(Fig. 25.) One hundred trees can be sprayed with this machine per hour. The pump is fitted with eight feet of hose and the Improved Excelsior Orchard nozzle. Three feet of return hose is attached, with which is connected a discharge pipe, so that at every stroke of the pump a small portion of the liquid is returned into the barrel near the bottom of the suction pipe, which keeps the poison and water well mixed, which is very essential to prevent burning the foliage. The out-



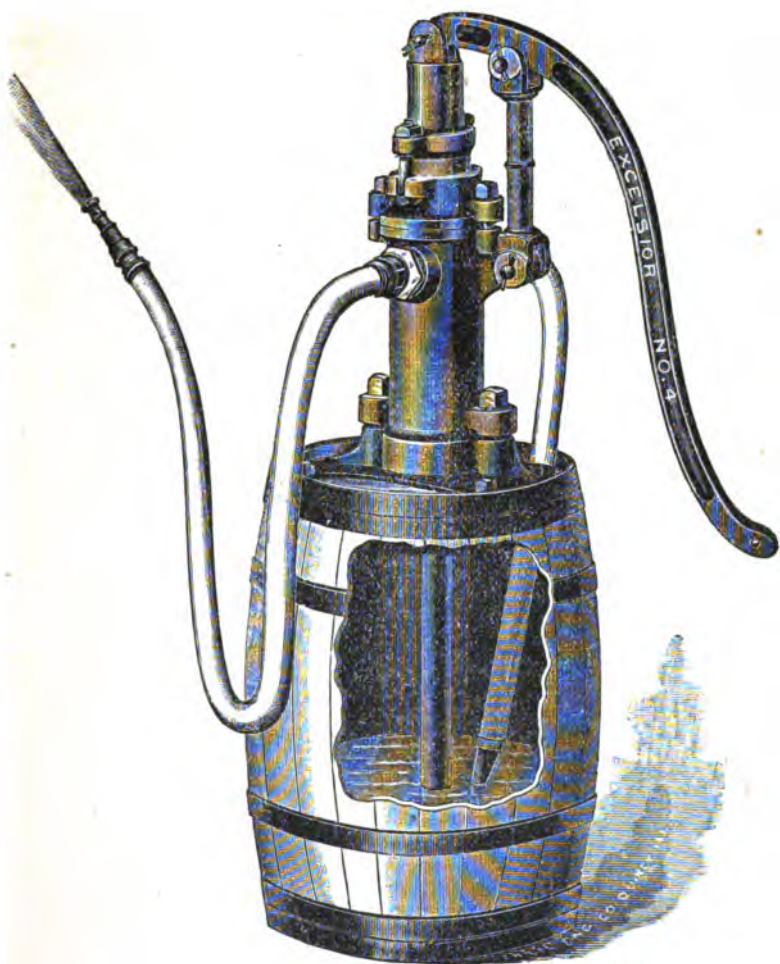


FIG. 25. BARREL SPRAYER. (Excelsior outfit.)

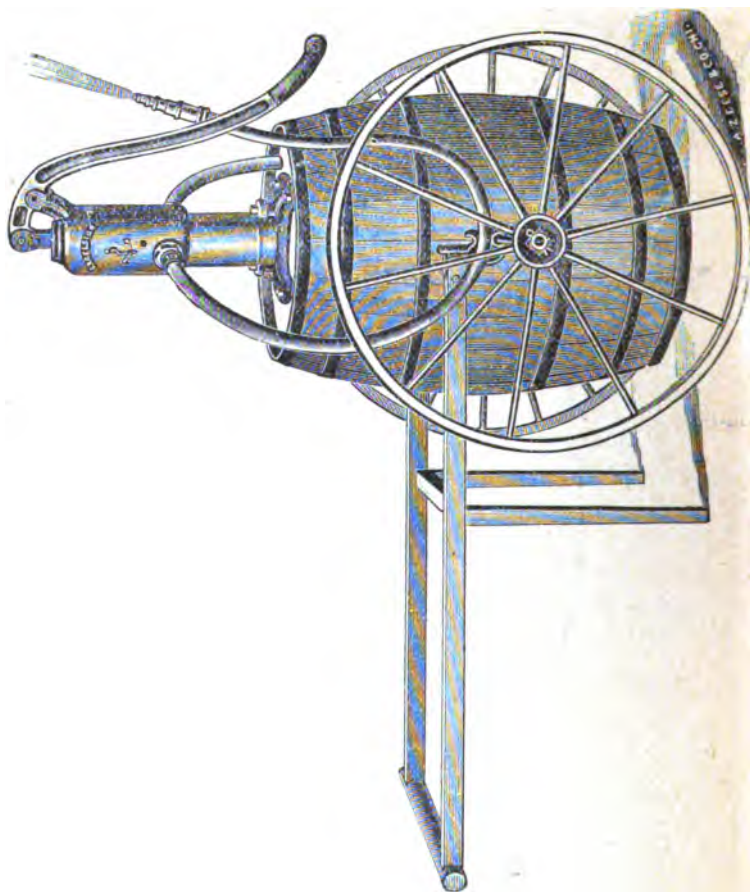


FIG. 20. HAND-CART SPRAYER. (Escalator Outfit.)

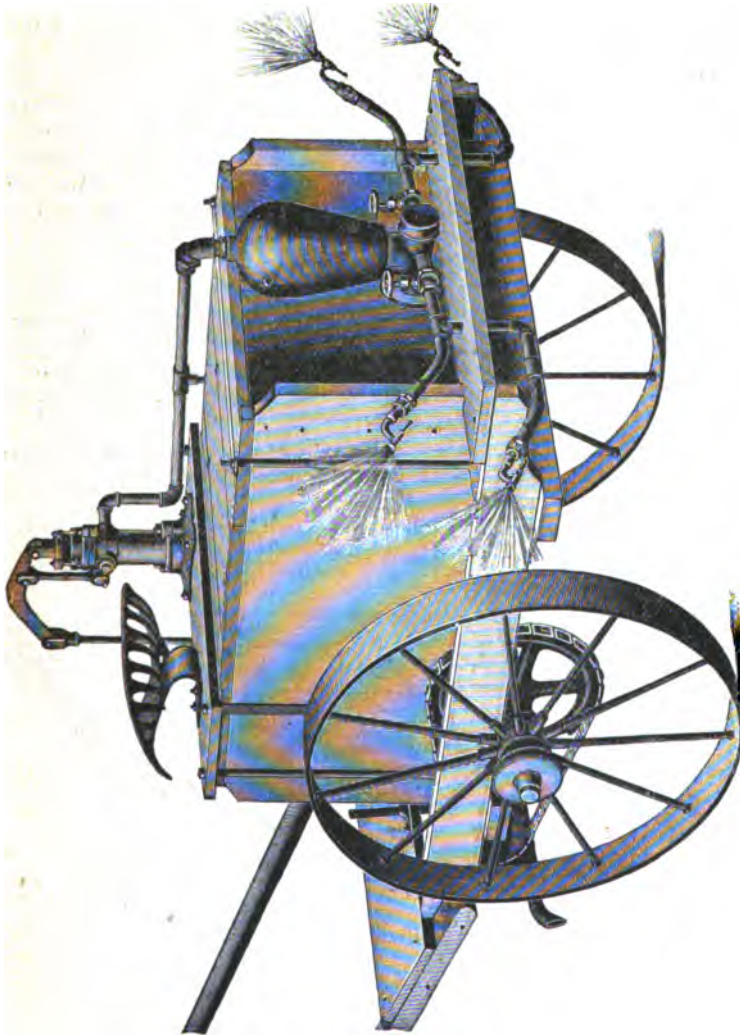


FIG. 27. HORSE-CART SPRAYER. (Excelsior Outfit.)



fit is also furnished with a fine strainer at the bottom of the suction pipe to prevent leaves or dirt entering the pump or nozzle.

Price of outfit, complete, without barrel, \$10.

Fig. 26 illustrates another hand-cart machine. In this one the barrel is mounted on metal wheels, and is furnished with a hose returning into the barrel, for the purpose of keeping the liquid continually agitated—a very important matter in securing efficient spraying. Cost, complete, as shown in cut, \$19.

Fig. 27 illustrates a one-horse-power machine, with a capacity of a 60-gallon tank, which is mounted on iron wheels three feet in diameter, and having a tire 3½ inches wide. Middle of tread, 3½ feet. The pump is double acting. A pipe leads from the pump to the large air chamber on the rear, and from this pipe an agitator is run down into the tank. The pipes shown on the rear and leading from the air chamber are for use in spraying vineyards, small fruits, and garden vegetables. As these pipes are adjustable, any desired direction may be conveniently given, to spray the plants thoroughly from top to bottom. The Vermorel nozzles, particularly adapted to this kind of work, are attached to these pipes.

Two sections of discharge hose, 10 feet each, are furnished, which may be attached either to the pump, air chamber, or pipes, to suit the wishes of the operator. The pump, like the Wellhouse, is worked by means of a sprocket wheel and chain connected with one of the cart wheels, as shown on the near side of the machine, and can be thrown in and out of gear by a lever on the platform in front of driver. Stopcocks are so provided that the spraying may be shut off from any part of the machine.

From a careful study of this machine, it appears to be the most complete and desirable one-horse machine yet offered. Cost, complete, \$65.

The cost, as suggested in regard to the Wellhouse, may be reduced quite low to a single individual by several persons uniting in its purchase.

Fig. 28 is a simple and cheap outfit, and for small plantings may be made quite useful. All the working parts are made of brass. The pump is set into a bucket and supported on the outside by an iron rod, constructed with a stirrup loop at the bottom, into which the operator places his foot to hold down the pump while in use. Cost, complete, \$4.50.

#### NOZZLES.

There are many kinds offered and recommended by manufacturers, and some of them are highly recommended by the government experiment stations. For all purposes, the Vermorel seems to be in the greatest favor. This one is shown attached to the hose of the knapsack sprayer—figure 24. Others, such as the Gem, cost, 75 cents; Eureka, cost, \$1.25; Excelsior, (see Fig. 25,) cost, \$1; Wellhouse, (see Figs. 22 and 23,) cost, \$1.

For horse-power machines, the Wellhouse nozzle is preferred. Its simplicity,



FIG. 28. BUCKET SPRAYER.  
(Excelsior outfit.)

ease in working and free delivery cannot be excelled. It seldom becomes clogged, and if it should, it can be cleaned in a few minutes and without leaving the machine. The essential point in a nozzle is a full, strong flow of the liquid, thoroughly broken up into a fine spray mist and having a great breadth.

**NOTE.**—It is due to the author of this paper to state that no part of this paper relating to machines is intended to favor any manufacturers of pumps, etc., but it is written with the sole purpose of benefiting Kansas fruit growers. There may be other just as good machines as any here mentioned, and if any reader can point to better ones, it is due to the fruit interests of the state to make it known.—**SECRETARY.**

The insecticides used in spraying are:

*First.*—London purple.

*Second.*—Paris green.

*Third.*—Kerosene.

For formulas, see solutions A, B, and C, on page 128.

Kerosene is only preferable in instances where London purple or Paris green cannot be used. For the suppression of the tree cricket, it may become a valuable insecticide. Most of the infants of this species remain among the weeds and low-growing plants, but in their adult and perfect stage they ascend the trees and feed upon the fruit, and it is then that they can be reached with kerosene emulsion.

#### TIME FOR APPLICATION.

For the suppression of the Tarnished Plant Bug, Plum Curculio, Tent Caterpillar, Leaf Roller, Canker Worm, etc., spraying must begin with first opening of the fruit and leaf buds, as these insects begin foraging as soon as there is any growth to feed upon. Each thoroughly applied spray will be sufficient for a week or 10 days for these species, unless washed off by rains.

For the Codlin Moth or apple worm, begin as soon as the blossom leaves drop off, and thereafter the same sprayings recommended for the other species heretofore mentioned will answer for this species. Three sprayings for all classes, made about 10 days apart, will be sufficient, excepting for the Plum Curculio. The spraying should be continued with this insect until the fruit is formed. I very much question the utility of spraying the plum after it is formed, for the most vulnerable period of attack on the Plum Curculio is before, and if the treatment failed then, there is but little hopes for successful combat afterwards.

A successful treatment for the Apple Curculio has not yet been determined, as the natural habits of this insect are not fully known. It is quite evident that, like the Plum Curculio, it must be attacked during its foraging season and before it begins to deposit its eggs. Some evidence leads to the conclusion that it feeds upon the foliage during the early spring months, and that the spraying for other species will also help in suppressing it; but it is also evident that spraying should continue until the middle of July.

Undoubtedly, further and more special investigations will in the near future disclose fully its habits, and then a simple and efficient treatment will be found. In this line of investigation all interested persons should assist, by which the desired purpose will be hastened.

#### REQUIREMENTS.

In spraying, it must be borne in mind that thoroughness is absolutely essential, both as a matter of success and economy. A drenching spray is not desirable, and such is liable to be injurious, beside being wasteful. The finer the liquid is divided and the more evenly distributed, the greater will be the protection, and especially is this important in attempts to cover the leaf surface upon which the leaf-eating

species exist. The least particle of the poisonous spray entering their stomachs will prove fatal to them.

A fine mist-like spray and an even distribution on the tree or plant depend mainly upon the character of implements used, and the care and intelligence of the operator.

The implement selected should have sufficient force not only to send the spray into any part of the tree to be treated, but to cause it to be finely broken up, through the help of a suitable nozzle. A horse-power machine equipped with a rotary force pump and the Wellhouse nozzle furnish the best means for accomplishing these results.

The operator of any spraying machine should become fully posted on all essential points in the work and familiar with the working of his machine, and any omissions of necessary attention which will make him master of the implement and its uses will result in disappointment and discouragement. Hence, the importance of testing all machines before taking them into the orchard or the field, as some imperfections or weak points may be discovered, and will be more easily and quickly repaired or improved at the implement room than in the field, and which would save much time and vexation.

### SPRAYING FROM THE HYGIENIC STANDPOINT.

[An extract from Farmers' Bulletin No. 7, U. S. Department of Agriculture.]

The only insecticide sprays which are at all dangerous to use are the arsenic compounds, and even here the danger is greatly exaggerated by those not conversant with the facts. Paris green and London purple have for many years been extensively used in this country as insecticides, and a fatal case of poisoning, from their use as such, has never been substantiated. The only danger lies in having the poison about a farm or plantation in bulk. In the early days of the use of Paris green against the Colorado potato beetle, a great deal of opposition was developed on account of the supposed danger; and only recently the sale of American apples in England has received a setback, owing to the supposed danger of arsenic poisoning from their consumption. The question as to whether arsenic may be absorbed by the growing plant, in any degree, was long ago settled in the negative by the best chemist in the country. Dr. Wm. McMurtrie, formerly chemist of this department, in 1878 showed that, even where Paris green was applied to the soil in such quantities as to cause the wilting or death of the plants, the most rigorous chemical analysis could detect no arsenic in the composition of the plants themselves. Other experiments in a similar direction, by Prof. Robert C. Kedzie, of the Michigan Agricultural College, confirmed these conclusions. It is safe, then, to assume that the only way in which fruit or vegetables can convey the poison to the consumer will be through the very minute quantity of arsenic left upon the edible part of the plant. Against the possibility of such an effect, the following facts may be urged:

1. It would seem at first glance that the use of an arsenical poison upon a plant like the cabbage would be very unsafe to recommend, yet Paris green and London purple are used upon this crop to kill the several species of leaf-eating worms which are so destructive to it, and an absolute absence of all danger, where the application has been properly made, has been recently shown by Professor Gillette, of the agricultural experiment station of Colorado, by the following *reductio ad absurdum*:

" . . . Where the green (Paris) is dusted from a bag in the proportion of one ounce of the poison to 100 ounces of flour, and just enough applied to each head to

make a slight show of dust on the leaves, say for 28 heads of cabbage one ounce of mixture, the worms will all be killed in the course of two or three days, while the average amount of poison on each head will be about one-seventh of a grain. Fully one-half of the powder will fall on the outside leaves and on the ground, and thus an individual will have to eat about 28 heads of cabbage in order to consume a poisonous dose of arsenic, even if the balance of the poison remained after cooking."

2. In case of spraying apple orchards for the Codlin Moth, there is scarcely a possibility of injury to the consumer of the fruit. A mathematical computation will quickly show that, when poison is used in the proportion of 1 pound to 200 gallons of water (the customary proportion), the arsenic will be so distributed through the water that it will be impossible for a sufficient quantity to collect upon any given apple to have the slightest injurious effect upon the consumer. In fact, such a computation will indicate beyond all peradventure that it will be necessary for an individual to consume several barrels of apples at a single meal in order to absorb a fatal dose, even should this enormous meal be eaten soon after the spraying and should the consumer eat the entire fruit.

3. As a matter of fact, careful microscopic examinations have been made of the fruit and foliage of sprayed trees at various intervals after spraying, which indicate that after the water has evaporated the poison soon entirely disappears, either through being blown off by wind or washed off by rains, so that after 15 days hardly the minutest trace can be discovered.

4. In the line of actual experiment, as indicating the very finely divided state of the poison and the extremely small quantity which is used to each tree, Prof. A. J. Cook, of the Michigan Agricultural College, has conducted some striking experiments. A thick paper was placed under an apple tree which was thoroughly sprayed on a windy day, so that dripping was rather excessive. After the dripping had ceased, the paper (covering 72 square feet) was analyzed and four-tenths of a grain of arsenic was found. Another tree was thoroughly sprayed and subsequently the grass and clover beneath it were carefully cut and fed to a horse, without the slightest sign of injury.

## SPRAYING WITH INSECTICIDES.

BY D. C. BURSON, TOPEKA, CHAIRMAN OF COMMITTEE ON SPRAYING.

Owing to floods of water and dearth of fruit, the year 1892 has enlightened the fruit grower of Kansas but little upon the subject assigned us on which to make a report, namely, *Spraying with Insecticides*.

You have not forgotten the condition your orchards were in last spring at the time spraying should have been done. In many orchards, a team would almost mire. Consequently many of you made no effort at all to spray. Others, again, whose ground was more favorably located, succeeded in spraying, merely to see a heavy rain come in a few hours and wash it all off.

Therefore all the report your committee can make from this year's observation is, that no orchards in Kansas were sprayed in such a manner as to produce any effect, one way or the other. And where apples did remain on the trees, they were universally inferior. Scarcely a perfect apple could be found in the state.

Now, whether this condition of the fruit could have been changed had there been an opportunity to effectually spray the trees, I will leave the society to discuss and maturely consider.

Yet we have no hesitancy in saying that, even should it be decided that the year

1892 has proven nothing either for or against spraying, the 10 previous years have furnished ample evidence of its efficacy.

I think we are indebted to Prof. A. J. Cook, of the Michigan Agricultural College, for the successful application of arsenical solutions to destroy the Codlin Moth, Canker Worm, and curculio. But previous to that, botanists had discovered a remedy for plant disease or fungous growths. This is a French remedy, known as the Bordeaux mixture, and is now extensively used throughout this country, to prevent the black spot or scab on apples, and mildew or black rot on grapes. And now, since insecticides and fungicides have passed the experimental stage and are established necessities with the fruit grower, it is to the combination of these two remedies that we wish to call the attention of this Society, hoping that the subject will receive the attention and discussion that it merits.

Professor Weed, formerly of Ohio Agricultural College, now of New Hampshire, in an article published in *Agricultural Science* in 1889, called attention to this combination, whereby the practical man might "kill two birds with one stone." He said: "It is of little use to save an apple, plum or pear orchard from the ravages of the Codlin Moth or curculio, if it is to be disfigured or destroyed by scab or rot. Now, while it is necessary to prevent as far as possible injuries from both these classes of organisms, it is evident there will be a great loss of time and labor if each is treated separately. For instance, the farmer who sprays his apples, plums and pears with arsenites for the Codlin Moth and curculio, and again with a solution of copper sulphate for scab or rot, would have accomplished the same end in half the time by mixing the insecticides with the fungicides."

After the publication of this article, a great many experiments were made with the combination, and were found to be wonderfully successful and satisfactory. As there are a number of formulas for making the Bordeaux mixture, we would recommend the one used by Professor Green, of the Ohio experiment station, which is not half as expensive as the original French formula, and has proven just as effective. This formula consists of 4 pounds of copper sulphate and 4 pounds of lime to 50 gallons of water. And all that is required to make the combination is to add to the 50 gallons of Bordeaux mixture one pound London purple.

Should it be deemed expedient to apply the fungicides in the early part of the season, before the blossoms have fallen, we would not advise adding the London purple, for you would not reach the larva of the Codlin Moth, and may injure bees that are at work on the blossoms of the fruit. But as soon as the blossoms have fallen, we would recommend the combination, for throughout the entire state apples are subject more or less to black spot or scab, and if the fungicide will accomplish what our learned botanists and horticulturists claim for it, we would say by all means apply it with the insecticides, as no harm can possibly follow its application.

#### PEACH ROT.

[A letter from Prof. F. D. Chester, mycologist at the Delaware Agricultural Experiment Station, Newark, Del.]

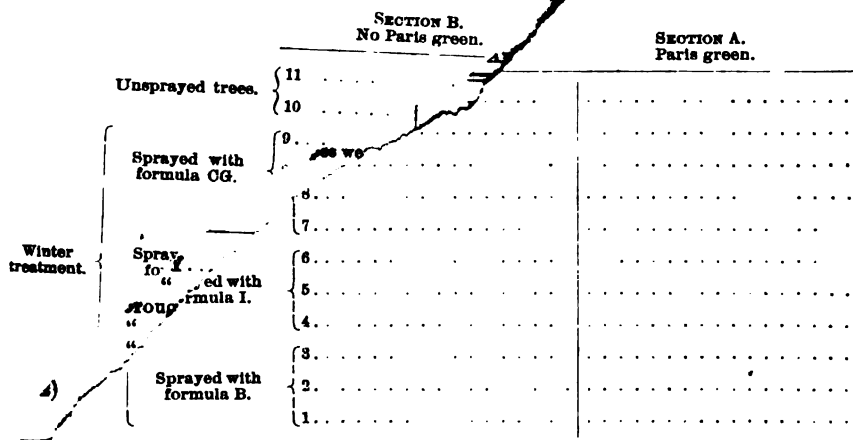
In accordance with your request of December 9, 1893, I have the pleasure of giving you a summary of the results of this station last year, 1893, in the treatment of peach rot.

The work in this direction for 1893 was successfully carried out in but one orchard, that of Mr. J. W. Killen, of Felton. The trees were early varieties, mostly Early Alexander, or of that class, and the materials used were as follows:

**FORMULA B—Ammoniacal Solution of Copper Carbonate:** Copper carbonate, 4 ounces; ammonium carbonate, 16 ounces, pulverized. Mix, and dissolve in a few quarts of hot water; then dilute with cold water to 45 gallons.

**FORMULA I—Ammoniacal Solution of Copper Carbonate (stronger form):** Copper carbonate, 8 ounces; ammonium carbonate, 16 ounces. Mixed and dissolved as in formula B, above. Water, 45 gallons.

**FORMULA CG—Copper Carbonate in Suspension:** Copper carbonate, 16 ounces; glue, 8 ounces; water, 45 gallons.



The portion of the orchard to the right in the figure (section A) was sprayed with Paris green, 5 ounces to 100 gallons of water, for the curculio. Section B received no Paris green.

The operations of the experiment were as follows: On March 27, the trees were carefully inspected, and all mummified fruits hanging to the trees were removed. Rows 2, 5 and 8 were sprayed March 27 with a solution containing 1 pound of copper sulphate to 25 gallons of water, the so-called winter treatment. The first application of the several formulas was made April 8. At this date the blossoms were swollen but not open. The object of the spraying at this date was to protect the blossoms from blight, caused by the apple-scab fungus.

On May 6 and May 18, all the trees in section A were sprayed with the Paris-green mixture, as already given. On June 18, another application of the several formulas was made. Owing to injury to the foliage, no further applications were made.

Results of the experiment were as follows:

	Decayed fruit.
88 trees sprayed with formula B.....	14.6 per cent.
46 " " " " I.....	9.8 " "
58 " " " " CG.....	10.2 " "
29 " not sprayed.....	29.1 " "

In general terms it may be said, that when either formula I or formula CG was used, sprayed trees gave threefold as many sound peaches as trees not sprayed.

Had we been able to continue the spraying up to near the harvest of the fruit, I believe that the results would have been more striking; but injury to the foliage made it advisable to discontinue. This has been the great drawback to our work, and the problem of selecting a fungicide which will not injure the trees yet remains an open one. This problem we hope to solve, however, in the near future.

I am satisfied that peach rot can be controlled, but much remains yet to be done.

The result of spraying with Paris green has been, without exception, to increase the yield of fruit. In other words the Paris green, by lessening the injury of the curculio, has prevented, in a measure, the "drop" due to the sting of this insect.

Eighty-three trees sprayed with Paris green gave an average yield of 38.5 pounds per tree, while 44 trees not sprayed with Paris green gave an average yield per tree of only 12.3 pounds.

The combined effect of the spraying has therefore been to increase the yield of sound fruit at least sixfold.

### SAFETY IN EATING SPRAYED FRUIT.

BY PROF. HERBERT OSBORNE, IOWA AGRICULTURAL EXPERIMENT STATION.  
[Bulletin No. 122]

A few months since I was somewhat surprised to hear from a prominent horticulturist that he did not spray his orchard, because there was a prejudice in his home market against apples that had been sprayed to prevent injury from the Cod-lin Moth. It seems unfortunate that a method proven to be so effective and inexpensive should have to be dropped, or fight its way against this prejudice—a prejudice that has probably prevailed in large part among fruit growers who have been too shiftless to protect their own fruit, and are, therefore, in some argument is being used in foreign countries to bring prejudice against American fruit, and it seems appropriate to present here an extract from Professor Riley's recent lecture before the Lowell Institute, in Boston, in the following words:

"The latest sensational report of this kind was the rumor, emanating from London within the last week, that American apples were being rejected for fear that their use was unsafe. If we consider for a moment how minute is the quantity of arsenic that can, under the most favorable circumstances, remain in the calyx of an apple, we shall see at once how absurd this fear is; for, even if the poison that originally killed the worm remained intact, one would have to eat many barrels of apples at a meal to get a quantity sufficient to poison a human being. Moreover, much of the poison is washed off by the rain, and some of it is thrown off by natural growth of the apple, so that there is, as a rule, nothing left of the poison in the garnered fruit. Add to this the further fact that few people eat apples raw without casting away the calyx and stem ends, the only parts where any poison could, under the most favorable circumstances, remain, and that these parts are always cut away in cooking, and we see how utterly groundless are any fears of injury and how useless any prohibitive measures against American apples on this score."

### ANALYSIS OF SPRAYED GRAPES.

[Extract from bulletin No. 41 of the New York Agricultural Experiment Station, at Geneva.]

In September, 1891, the New York city board of health seized and destroyed large quantities of grapes, on the ground that they had been sprayed with copper compounds and were poisonous. This action caused a serious loss to many grape growers. Mr. D. G. Fairchild, representing the United States department of agriculture, visited the Hudson river regions, where the grapes were grown which had been seized. He took pains to secure the worst sprayed bunches of grapes obtainable from those vineyards from which the condemned grapes came. These samples were given to the chemist of this station for analysis.

In some instances the copper compounds could be seen upon the berries; but it could be seen to be more plentiful upon the stems. In three samples, the berries were separated from the stems and the amount of copper determined upon each. In one instance, the berries and stems were not separated.

In the table following, the samples from Marlborough were taken from two different vineyards. The samples 3 and 3a, were from the same vineyard. In sample 3a, the copper was estimated upon the berries and stems together, and not separately. In the table, the copper is given as metallic copper, the number of grains found for one pound of berries and stems.

TABLE SHOWING ANALYSES.

Locality where samples of grapes were obtained.	FROM ONE POUND OF BERRIES AND STEMS.		
	Grains, estimated as metallic copper, on berries.	Grains, estimated as metallic copper, on stems.	Grains, estimated as metallic copper, on berries and stems.
(1) Milton, N. Y. ....	1 $\frac{1}{8}$	.....	} 50
" " .....	.....	90	
(2) Marlborough, N. Y. ....	1 $\frac{1}{8}$	.....	
" " .....	.....	60	
(3) " " .....	1 $\frac{2}{8}$	.....	
" " .....	.....	14	
(3a) " " .....	.....	.....	} 12
Average for all samples .....	1 $\frac{1}{8}$	.....	} 15
	1 $\frac{1}{8}$	.....	} 50

The results embodied in the table above may be summarized as follows:

1. The amount of copper, estimated as metallic copper, found on the berries, was very constant in the different samples, averaging  $\frac{1}{110}$  of a grain for each pound of fruit (berries and stems).

2. The amount of copper, estimated as metallic copper, found on the stems, varied from  $\frac{1}{36}$  to  $\frac{1}{14}$  of a grain for each pound of fruit (berries and stems), and averaged  $\frac{1}{36}$  of a grain.

3. If the copper were on the berries in the form of sulphate of copper, each pound of berries would contain about  $\frac{1}{30}$  of a grain of copper sulphate. When copper sulphate is prescribed by physicians as a tonic or astringent, the dose is from one-fourth to two grains. Hence, if a person were to eat and swallow the grape skins, as well as the pulp of the berry, it would be necessary to eat from  $7\frac{1}{2}$  to 60 pounds of grapes in order to get a tonic dose of copper sulphate. Or, if one were to eat berries and stems, it would be necessary to eat from  $1\frac{1}{2}$  to 10 pounds to get a tonic dose of copper sulphate.

To get an amount of copper that would be regarded as serious if taken at one dose, one would need to eat not less than 3,000 pounds of grapes, skins included, or not less than 500 pounds, including berries and stems; and it is safe to say, that if an attempt were made to get a dangerous dose of copper into the body in this way in a short time, a person would be in a dangerous condition many times from the grapes alone, before running any risk from the copper. To state the matter in another way, if one were to eat each day one pound of the worst sprayed grapes, including the skins, and if all the copper taken in this way were to accumulate in the body, it would require over eight years to accumulate an amount of copper that would, if taken at one dose, be considered dangerous, not necessarily fatal.

4. . . . Most of the copper found was on the stems, which people do not eat;



and the rest of the copper was on the outside of the skin of the berries, which most people do not eat.

5. The results obtained from estimating by chemical analysis the amount of copper on grapes which were selected as being the worst sprayed that could be found, therefore, seem to justify the assertion that it is simply an absolute impossibility for a person to get enough copper from eating grapes to exert upon the health any injurious effect whatever.

### DOES IT PAY TO SPRAY?

[Farmers' Bulletin No. 7, Department of Agriculture, Washington, D. C.]

Probably in no country of the world is spraying for fungous diseases of fruits practiced to the same extent as in the United States. Five years ago practically nothing was known of this subject; in fact, the number actively engaged in spraying their trees, vines, etc., for such diseases as apple scab, and black rot, downy mildew, and other diseases of the grape, did not exceed half a hundred, all told. Now, as a fair estimate, probably no less than 50,000 fruit growers are engaged in this work. From the Atlantic to the Pacific and from the Great Lakes to the Gulf, the methods recommended by this department are practiced every year. Canada has also adopted many of the suggestions made by us, and even Australia is actively engaged in experiments in the treatment of apple, peach, pear and other diseases in accordance with suggestions originating with this department. The question "Does it Pay?" is in large part answered by the facts already given. No work that did not carry merit with it could have had such a phenomenal growth. To give a more direct answer, however, it may be stated that in 1891 250 grape growers in different parts of the country made a series of observations with a view of obtaining some definite information as to the value in dollars and cents of the recommendations of the department in the treatment of grape diseases. The facts reported by these men show conclusively that the actual profit to them over all expenses resulting from the treatment of black rot and downy mildew was, in round numbers, \$37,000. Of this sum, \$13,000 was reported from the state of New York alone. Other examples equally as striking could be given, but this is sufficient for our purpose. Of course, everyone is not successful, but where failure is reported it is usually easy to locate and remedy the trouble.

[By Prof. L. H. Pammel, Agricultural Experiment Station, Ames, Iowa.]

It pays to treat vines for black rot. (See Figs. 29, 30, 31.) The cost of spraying an acre of vines six times was \$7.35. At the rate of  $3\frac{1}{2}$  pounds of fruit per vine, 1,750 pounds of grapes were produced on one acre, which, at 3 cents per pound, would be \$52.50, leaving a balance, after deducting the cost, of \$45.15.

In one acre of vines not treated the yield was only 500 pounds, which, at 3 cents per pound, would be \$15; deducting this from the net of \$45.15, the value of the product of an acre sprayed, would leave a balance of \$30.15 in favor of the treatment.

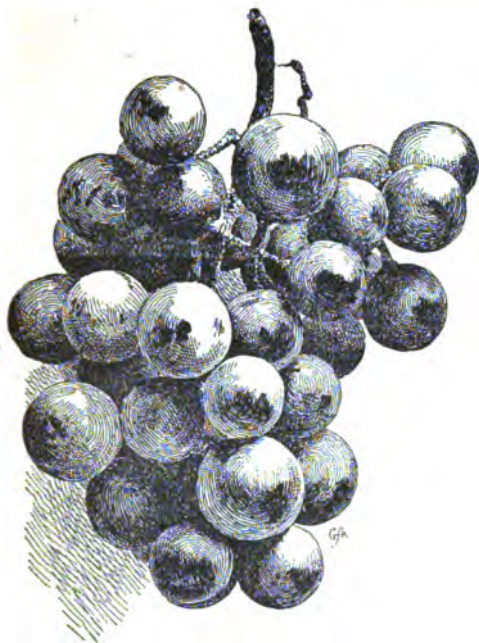


FIG. 29.



FIG. 30.

## GRAPE ROT.

Fig. 29, sprayed; Figs. 30 and 31, not sprayed.  
After Galloway, in *American Garden*.



FIG. 31.

## DOES SPRAYING INJURE THE PLANT?

BY PROF. HERBERT OSBORN, IOWA AGRICULTURAL EXPERIMENT STATION.  
[Bulletin No. 17.]

There is no question that spraying with too strong preparations of the arsenical poisons, and, also, with kerosene emulsion, will injure plant life; and certain plants are much more susceptible to their influences than others. The injury here referred to is that which becomes observable within a few days after application, and which becomes apparent from spotting, withering and falling of the leaves. It is asserted by some, however, that, even where there is no immediate injury, the poison is absorbed by the tissues of the plant, a slow poisoning is induced, and the leaves fall earlier than they should; and that in a year or two the tree or vine may die. The experience with spraying has now extended over many years, and, if this were true in any large degree, we certainly should have abundant evidence of it ere this; and it does not seem reasonable to oppose spraying on this ground.

## FORMULAS FOR PREPARATION OF INSECTICIDES AND FUNGICIDES.

[NOTE.—All the following mixtures should be constantly agitated while being used.]

## INSECTICIDES.

SOLUTION A.—*London Purple*—formula by Riley:

1 pound London purple,  
150 gallons water.

*Preparation.*—Make the purple into paste, and then add the water. To prevent burning of the foliage of peach and plum trees, add to the solution two gallons of lime water to each 100 gallons of the poison.

SOLUTION B.—*Paris Green*—formula by Riley:

1 pound of Paris green,  
150 gallons water.

*Preparation.*—Same as for London purple, adding the lime water proportionally.

MIXTURE C.—*Kerosene Emulsion*:

2 gallons kerosene,  
½ pound common soap,  
1 gallon water.

*Preparation.*—Heat the solution of soap and add it boiling hot to the kerosene; churn the mixture by means of a force pump and spray nozzle for 5 or 10 minutes. The emulsion, if perfect, forms a cream, which thickens upon cooling, and should adhere without oiliness to the surface of glass. Rain water should be used when obtainable. If hard or lime water is used, add a little lye to "break" it. For most insects dilute one part of the emulsion with 15 parts of water. For soft insects, like plant lice, the dilution may be carried to from 20 to 25 parts of water.

London purple and Paris green are of the greatest service against all masticating insects, as larvæ and beetles, and they furnish the most satisfactory means of controlling most leaf feeders, and the best wholesale remedy against the Codlin Moth.

These poisons, when applied alone to the peach, will burn the leaves. Whenever, therefore, the application is to be made to tender foliage the lime water recommended should be added. With the apple, in spraying for the Codlin Moth, at least two applications should be made—the first after the falling of the blossoms or when the apples are about the size of peas, and the second a week or 10 days later. For the Plum Curculio, on the plum, cherry, peach, etc., two or three applications should

be made, during the latter part of May and the first half of June. The poison in this case is applied for the purpose of destroying the adult curculios, which gnaw into the young growth of trees, and even into the hard young fruit, before laying their eggs. In the case of most leaf-feeding insects, one should spray on the first indications of their presence.

Fruit trees should not be sprayed with these poisons while in bloom, as there is no advantage in doing so, and honeybees are reported to be at times killed by working in the sprayed blossoms.

The kerosene emulsion is used against such insects as draw their nourishment from trees and plants by sucking, and which are not masticators, such as Tarnished Plant Bug, whose beak is inserted and, as it were, pumps up the juices of the substance on which they feed. The emulsion kills by coming in contact with the body of the insect, and not through being taken into the stomach.

Pyrethrum and hellebore are used in powdered form, and in most cases in a dry condition, by being dusted upon plants of a low growth, like garden vegetables, by means of implements manufactured for such purposes. These should be applied to plants when their leaves are moist from dews.

#### FUNGICIDES.

##### MIXTURE D.—*Sulphate of Copper:*

1 pound sulphate of copper.  
25 gallons of water.

*Preparation.*—Dissolve the sulphate of copper in boiling hot water and add water to it sufficient to make 25 gallons. This is used on trees and plants as the first spraying and before the buds open in spring.

##### MIXTURE E.—*Bordeaux Mixture* (original form):

6 pounds sulphate of copper.  
4 pounds lime.  
25 gallons of water.

*Preparation.*—Dissolve the sulphate in hot water, then dilute to 10 gallons with cold water. Slake the lime (quicklime is best) and bring it to the consistency of milk. Pour this milk of lime slowly through a strainer into the sulphate of copper solution, stirring the mixture thoroughly while doing so, and dilute to 25 gallons of water.

##### MIXTURE F.—*Bordeaux Mixture* (half strength):

Dilute the above to 50 gallons water instead of 25 gallons. This form has proven of sufficient strength for all purposes.

##### MIXTURE G.—*Ammoniacal Solution of Carbonate of Copper:*

8 ounces carbonate of copper.  
1 quart strong ammonia (26° Baumé).  
25 gallons of water.

*Preparation.*—Place the copper carbonate in a well-corked bottle, and add slowly thereto the ammonia. Shake it vigorously at repeated intervals. When ready to use it, dilute with 25 gallons of water. It is well to prepare as many bottles of this as will be needed for one spraying, the day before using.

##### MIXTURE H.—*Neutral Bordeaux Mixture:*

Dissolve 4 pounds of sulphate of copper in hot water. Cool the solution by mixing with 6 or 8 gallons of cold water. Then add milk of lime cautiously until red litmus paper (obtained of any druggist) dipped into the mixture just begins to turn blue. Then dilute with water to 25 gallons. This is used specially for peach rot.

##### MIXTURE I.—*Copper-Carbonate and Ammonium-Carbonate Mixture* (original form):

8 ounces carbonate of copper.  
1 pound pulverized carbonate of ammonia.

*Preparation.*—Mix these together, and dissolve in a couple of quarts of hot water, and dilute to 25 gallons of water. This mixture can be packed in quart fruit jars, and enough can be made ready at one time for one spraying.

MIXTURE J.—Later form of the above: Use 8 ounces of carbonate of copper, instead of 3 ounces, as in original form.

MIXTURE K.—*Dilute Bordeaux Mixture* (by Prof. J. W. Green, Ohio Agricultural Experiment Station):

4 pounds sulphate of copper.  
4 pounds quicklime.  
50 gallons of water.

*Preparation.*—Prepared same as the original form (E). This has proven to be the best general-purpose fungicide; also, the best vehicle in which to convey the arsenical poisons (London purple and Paris green) for the destruction of foliage-eating insects. A too persistent and prolonged use of it must be avoided, however, as, if applied late, it may stick to the fruit until after it is ripe, and upon apples and pears it causes a russet appearance.

[NOTE.—The early dropping of apples, which has been charged to wet weather at time of blooming, was largely prevented the past season (1891) by early spraying with the Bordeaux mixture. A fair crop was secured from the sprayed trees, but none at all from the unsprayed. It has been fully demonstrated that premature leaf dropping of plum trees may be prevented by the use of Bordeaux mixture, and that, when Paris green or London purple is used for the curculio, it is necessary to use the Bordeaux mixture as a vehicle for conveying the poison.—SECRETARY.]

MIXTURE L.—*Copper-Arsenic Solution* (by Prof. J. W. Green, Ohio Agricultural Experiment Station):

*Preparation.*—Dissolve 6 ounces of carbonate of copper and 4 ounces of Paris green in 2 quarts of ammonia, to which add 50 gallons of lime water. This is an excellent combination of a fungicide and insecticide.

MIXTURE M:

22 gallons of water.  
6½ pounds sulphate of copper.  
3½ pounds fresh lime.

*Preparation.*—Dissolve the sulphate of copper in 3 or 4 gallons of hot water. Slake the lime, and make it a paste about as thick as cream. Stir the lime into the copper solution, and dilute to 22 gallons of water. The preparation may be freely used without injuring foliage. This mixture is used in spraying against apple rot.

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## SUMMARY OF THE USES OF THE INSECTICIDES AND FUNGICIDES RECOMMENDED IN THIS VOLUME.

### INSECTICIDES.

Solutions A and B are used in sprays to destroy all leaf-eating insects, as the Leaf Rollers, Caterpillars, Canker Worm, Handmaid Moth, Maple Worm, Fall Webworm, Apple Flea Beetle, Tree Cricket, and the Codlin Moth or apple worm, which infest the apple, peach, pear, and quince; Grapeberry Moth, Plum Curculio.

Mixture C is used to destroy all the suctorial classes of insects, such as draw their nourishment from plants and fruit by inserting their beak, by forcing the poison onto their bodies, thereby killing by contact and not by poisoning through the stomach.

#### FUNGICIDES.

Mixture D is used for the first spraying in spring, before growth of plants start, against black rot and anthracnose (rust) of the grape, anthracnose of the blackberry and raspberry, and apple scab.

Mixtures E, F and K are used for a second and third spray to check black rot and anthracnose of the grape, anthracnose of the blackberry and raspberry, apple scab, and strawberry leaf rust.

Mixture G is used for all sprays to control peach and plum rot.

Mixtures H, I and J are used as substitutes for the Bordeaux mixture.

L is a mixture combining a fungicide and insecticide, and is used for a second and third spray where insects and fungi are to be controlled, thus treating plants for both with a single application, and to save time and labor in spraying.

Mixture M is a form of Bordeaux mixture, to be used for apple, peach and plum rot, and is also effective against apple scab.

# REPORTS OF STANDING COMMITTEES, 1893.

## HORTICULTURE CONNECTED WITH FARMING.

BY B. F. HANAN, ARLINGTON, KAS.

In a broad sense agriculture includes horticulture and stock raising, but in a restricted sense it is the growing of grains and grasses for man and beast. Horticulture may be defined gardening, and includes the culture of vegetables, fruits, and flowers. The great aim of all mankind is happiness, and I know of no occupation which is capable of affording so much happiness as that of horticultural and farming pursuits.

Man must have good health in order to be happy in the fullness of the word, and what can be more health giving than the two occupations just mentioned? I can think of none.

Plenty of exercise in the open air may be had, and if one is careful to avoid overworking and unnecessary exposure, the pursuits will afford good health. In these days a farm is not considered complete without a supply of fruits, garden vegetables, and flowers.

I am aware that life on some farms is but a routine of drudgery, especially for the overworked wife and children. They are not happy, their home is not pleasant, and they long for the unknown something that will give more pleasure. This should not be. There is wrong somewhere, and if the father, mother and children are properly prepared for such life as horticultural and farming pursuits are intended to give, no unpleasantness would occur, other than such as are inevitable to all or any other occupations.

The farmer should aim to make his home the happiest place on earth for his family. In order to do this, he should see that his children receive a good education, and the family well supplied with books and papers for home reading; and enough of these should be devoted to current agricultural and horticultural topics to keep the family well posted in every important branch of their chosen occupation.

There is much pleasure in raising the best stock, and the best crops of grain, fruits, and flowers.

It is very gratifying to the farmer to be able to exhibit at the fairs a product of his intelligent culture that will win laurels in competing for prizes. But to excel others in order to gain praise only is not the most laudable factor in human happiness. But when his happiness comes from a consciousness that he has done mankind a benefit by teaching how to produce the best, his joy is worthy.

In order to make the farm home completely a happy one, the management must, as soon as possible, provide enjoyments suited to every member of the family.

As I have already said, health is of the greatest importance, and all the laws conducive to health must be obeyed. They demand good and pure food, and who can have such good, sound and fresh food as the farmer? He grows his own bread, meat, and fruit, and can have them all fresh and pure as he needs them. He can make his own golden butter and creamy cheese, and save his vegetables, fruits, etc., in various ways for future use. I will not attempt in this paper to give instructions for the

details of work on a farm, as space will not permit. But I do wish to emphasize the point, that I do not regard a farmer faithful to his charge who does not provide for his family a good vegetable, fruit and flower garden.

### FORESTRY FOR FARMERS.

BY E. T. DANIELS, KIOWA, KAS.

This subject is of such vast importance to the farmers of central and western Kansas that it seems strange they pay so little attention to it. Every farmer on the prairie should have at least a few acres devoted to forest; and, if well done, there is no work on the farm that will ultimately be better rewarded. There should be a belt several rods wide, extending across the place east and west on the south side, and another along the north side of the farm buildings, orchard, and garden. Also, on the south of these if they are situated very far from the south line. A good selection of trees rightly planted and well cared for will in four or five years amply repay one for all labor and money expended. On the south side of my four-year-old grove—which is six rods wide—on wintry days, with wind from the north, it is by actual test 20 degrees warmer than on the north side. There are many days in the winter season when I can work with comfort in the orchard or garden on the south side of this grove when it would be extremely uncomfortable to work on the opposite side. How the cattle and horses love its shade in summer and its leeward side on wintry days! What a splendid place for poultry, especially during mulberry season, which lasts three months or more! Several flocks of quail also come in for their share of fruit and friendly protection. These mulberries bore when two years old, and each year since, furnishing an immense amount of food for the poultry, which they prefer to everything else of fruit or grain kind, not even eating raspberries or blackberries while the former can be had. Out of a dozen kinds of trees in this grove the black locust has made the largest growth, and is one of the very best to withstand drought. The *ailantus* grows yearly in my favor. Black walnut, ash and red cedar are all doing well. Our native red cedar is a fine tree, and should be planted much more than it is. On the uplands, the maple, cottonwood and catalpa seem to do rather poorly. A farmer in starting a grove could hardly go amiss in planting our native trees, such as black walnut, ash, honey locust, and red cedar, supplemented by *ailantus* and Osage orange.

For planting, yearling trees are much the best. The ground should be deeply plowed, and the trees planted four feet apart each way and thoroughly cultivated for two or three years, hoeing when necessary, so as to completely kill out all weeds, after which the trees will take care of themselves. At four or five years some thinning may be done, and considerable wood, posts, etc., secured. Thus, with a little labor and small outlay of money, a farmer can in a few years have a forest that will not only add beauty and comfort to the home, but will grow in value as the years roll by.

### THE NECESSITY FOR IRRIGATION IN GARDENING.

BY H. A. KANHART, OXFORD, KAS.

The year 1893 will ever appear in history as the most disastrous in modern times, in every walk of life. The rich, the poor, the manufacturer, as well as the tiller of the soil—all have come under its baleful influence.



Never since this section was wrested from its primeval wildness has there been so little rain. The natural consequence of this was, the general gardener was "nowhere," and the expert failed in nearly everything. By diligent surface tillage, I kept my garden growing, with the expectation of having our usual fall rains; but, lo and behold, they came not, and so my labor was naught. Could I have given my garden one thorough wetting, I would have had an abundance of nearly everything.

This year's experience demonstrates, to me, the necessity of having a sufficient amount of water in storage, to be used as occasion may require. Every spring, all our streams are carrying countless millions of gallons of water to the sea, from which we realize, comparatively, no real benefit.

Why could not a system of dams in all our streams, with adjacent reservoirs and ditches, hold much of this water until needed? I consider a plan of this kind feasible; and as all plant life in Kansas holds up against drought better than in any other state in the union, I feel confident that all we need, to make our soil produce crops at which the world would stand amazed, is a liberal supply of water at the proper time.

So many farmers ask me, What do you think of mulching this, that, and the other thing, whatever it may be? My experience, for the past 10 years here in Kansas, is, that nature's mulch (*the earth*) is far superior to any other that you can use. Always plow deep, and then all through the season keep up surface tillage, and you can carry all vegetable life through the droughty spells; and, when the late rains come, you will be blessed with a bountiful crop.

A striking example of this, during the past season, came under my notice. A vineyard on the upland was plowed and thoroughly cultivated, and the grapes were larger, finer flavored and more evenly ripened than those grown on the river bottoms.

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## THE APPLE.

BY SAMUEL REYNOLDS, LAWRENCE, KAS.

The apple is not only the most widely-disseminated of all the fruits in the temperate zones, but in many respects it is the most important of all, bearing, as it does, the same relation to other fruits as the potato does to other vegetables, or wheat and corn to other cereals.

The term "apple" is said to be derived from the Celtic, and means round or ball shaped. In botany, the apple is known as *Pyrus malus*, and the acid of the apple is called malic acid, and possesses many valuable properties. Some writers tell us that it originated in western Asia, the original home of most of our best fruits. It is a historical fact that at a very early period the apple was carried into Italy, and by the conquests of the Romans its cultivation became general throughout all Europe. Our English ancestors brought the apple with them to this country, where its cultivation kept pace with the march of conquest and civilization. Many large orchards were planted by the Indians of New England and New York. There are still growing in western New York trees that were planted by the Indians more than a century ago.

In all nature there but few, if any, sights more beautiful than that of the apple tree covered with thousands of blossoms of lovely pink and white. I know of nothing more lovely, unless it be the same tree loaded with delicious fruit, dressed in richest yellow, red, and gold. It is both interesting and instructive to walk through a large apple orchard at flowering time and observe the varying colors, size and fragrance of the blossoms. It would seem that there nature had made a supreme effort

to give a charming variety where little variety might be expected. In fact, the flowers of each variety are so different and distinct from those of every other variety, that an acute observer may learn to distinguish and name all varieties by the difference in the size, form, color and fragrance of the blossoms. Also, the difference of the form and development of the tree, and its twigs and foliage, is such that an expert horticulturist can name the different sorts without even seeing the blossoms or the fruit. It is a fact to be noted, however, that the beauty and fragrance of the blossoms are no indications of the beauty and good qualities of the fruit.

Without doubt the apple is one of the most healthful of all our fruits. Its acids are both refreshing and cooling, and well adapted to aid digestion and to neutralize the bad effects of meats and heavier diets. The celebrated Doctor Hall says that "it would be better if our people would eat less bacon and grease and more fruit. In the morning there is an acrid state of the secretions, and nothing is so well calculated to correct this as the acid of fruits. The apple is one of the best of fruits, and either baked or stewed will generally agree with the most delicate stomach. Apples are an excellent medicine in many cases. Even green or half ripe apples stewed and sweetened are pleasant to the taste, cooling, nourishing, and laxative, far superior in many cases to the abominable doses of salts and oils usually given in fevers and other diseases. Raw and dried apples are better for constipation than pills."

The late venerable Orange Judd said that to his personal knowledge baked apples have cured the worst cases of constipation when all other tried remedies had failed.

As an article of diet the apple has become an absolute necessity in all well-regulated families. It is not only a luxury but a culinary necessity. The different dishes made from the apple are almost endless in variety.

The apple has been so long in cultivation, under so many different conditions of soil and climate, that its varieties have been greatly multiplied. The last estimate of named varieties was 8,000. One man in Illinois claims to have more than 2,000 in his orchard. Another man, in Leavenworth county, claims to have 1,000 sorts growing on his place. But our most practical orchardists are now no longer working for the multiplication of varieties, but are dropping the inferior sorts and confining their culture to a comparatively few meritorious sorts. The largest apple grower in Kansas cultivates but four varieties in his orchard of 400 acres, viz., Jonathan, Winesap, Missouri Pippin, and Ben Davis. The Jonathan is one of our best fall apples, is quite handsome and very salable. The Winesap is of medium size, rich in flavor, quite aromatic, and one of the best cooking apples grown. The others are grown for their large size, beauty in color, great productiveness and profit, rather than for quality. Many of the large apple growers of Illinois are confining their planting for market to one variety, the Ben Davis.

New varieties are obtained, as you all know, by planting apple seeds, of which not more than one in a thousand proves sufficiently meritorious to gain propagation.

So many varieties of apples are called "Pippins" that the name has almost become generic. Whenever a person is uncertain of the correct name of an apple it is usually called a Pippin. To call an apple a Pippin is to give it an honorable title. They are of an ancient family and the number of synonyms they have proves something of their good qualities, for a poor or useless article is not worth and seldom has a synonym.

When setting out an orchard, it should be remembered that the work is to be done not so much for the present as for the coming generation. The apple tree delights in a strong, firm, moderately-moist soil. It will grow on poor land, but will not thrive well and bear large crops of fine fruit. Give the apple tree an opportunity to develop itself, with good surroundings, and it will astonish you by what it can do.

Since the civilized world has learned that fruits must become a part of our diet in order to realize the best conditions of the human organism, there has been a great increase in their production, and the consumption has kept pace with this increase. Especially is this the case with the apple. In view of the increase in population, and the decay of old orchards, it becomes necessary that new plantations should be made, year by year, in order that this increased demand can be met.

On this continent, the apple succeeds well between latitudes 36 and 45. Above these latitudes, the trees cannot stand the severe freezing in winter, and below them the apple is out of its element, and has to give place to subtropical fruits.

The fact that the apple bears transportation to almost any distant market renders it an article of prime commercial importance. From the present outlook, it would seem almost impossible for more apples to be produced during the next generation than the markets of this wide country, with its great transportation facilities, together with the foreign demand, can handle and dispose of. They can be shipped north to British Columbia, south to the Gulf of Mexico, west to California, and east to the countries of Europe.

But the question of paramount importance to us farmers is, Will it pay us to grow apples here, under existing circumstances? From my own experience and observation, I emphatically answer, Yes. I could name farmers in this county who were able to tide over seasons of drought and short crops, without running into debt, by the income from a good-sized apple orchard. I set out a 5-acre orchard 34 years ago, and, although I suffered the disadvantage of not knowing what varieties would succeed in our soil and climate, it has paid me better than any 20 acres on the farm. This orchard has borne constantly for the last 20 years or more, with only one total failure. That occurred in 1875, the year after the grasshoppers appeared and ate out the fruit buds. The past season, bad as it was, this orchard supplied two families with all the fruit they could use, made several barrels of cider, and there were \$30 worth sold.

But remember, the orchard must be cared for. The bearing trees must be fed, either by manuring, or plowing under green crops. The bearing apple tree makes a triple demand upon the soil—first, for wood, then for leaves, and lastly for fruit; and, if there is not sufficient plant food in the soil to meet these demands, this necessary food must be supplied by adding fertilizers; and of these barnyard manure is best of all, because it not only furnishes the necessary plant food, but it greatly improves the soil.

The cultivation of the orchard must not be assigned to the long- or short-nosed rooters. Neither may the orchard be turned into a common pasture, for horses and cattle to browse on the trees. In a word, the apple orchard should receive as much intelligent care as any other crop on the farm. When that is done, it will be quite unnecessary to ask the question, Will it pay to grow apples in Kansas?

The failure of the apple crop, the past season, has been widespread and unprecedented. Kansas has not been alone. From Missouri, Illinois, Indiana, Michigan and Iowa come reports of almost a total failure of the apple crop. In some sections, the failure was as great as that of Kansas. But this failure ought not to discourage any fruit grower. It is only a circumstance, and may not recur during the lifetime of the present generation. It seems to be one of the physical laws of this Western country that extremes follow each other, so that we may reasonably look for a large crop of apples next season.

## ORCHARD CULTURE FOR SOUTHERN KANSAS.

BY G. W. BAILEY, WELLINGTON, KAS.

The selection of the ground for the orchard, preparation of the land, the best time for planting, age of the trees, their varieties, whether for family or commercial purposes, pruning and protection of the trees from rabbits and insects, cultivation—all of these properly belong and come under the above heading, and will be considered in the order named.

*Selection of the Ground.*—A northern slope is best, west or northwest second choice. If for family use, the orchard should be as near the house as is convenient. Any land that will produce a fair corn crop will grow apple trees and produce fruit, if properly managed.

*Preparation of the Land.*—The rows should be 33 feet apart east and west, 16½ feet apart north and south. Set this way, they will in a measure protect each other from the southwest wind that usually prevails here in southern Kansas during the time the trees are making the most rapid growth. Commence by plowing back furrows 33 feet apart east and west; continue this until all the land for the orchard is plowed. This will, if properly done, leave the dead furrows 33 feet apart. Then begin by plowing around the dead furrows about six feet from the center of the dead furrow on each side, plow these out and repeat the operation once or twice. The deeper the soil is stirred where trees are to stand the better. There is not much danger of overdoing this very important part of the work. The next thing will be to harrow the ground thoroughly. Then reverse the plowing, filling up the dead furrows; repeat this until the ground when settled will be nearly level. This should be done in the fall.

*Season for Planting.*—Spring, in my judgment, is the best time for planting fruit trees. Some of the reasons for thinking so are, that, as a rule, the months of March and April are dry and windy, so that the trees set in the fall are liable to be injured, if not die, for lack of moisture before the spring rains begin. The main reason why spring planting is preferred is this: An apple tree planted when full of sap, about the time when the leaves begin to show themselves, will seldom fail to grow; at least, this has been my experience. The ground being prepared, planting will be next in order. With a good, steady team, mark the land off east and west, in furrows 16½ feet apart, then north and south over where the dead furrows were made, or, if convenient, set stakes at each crossing of the east and west furrows. An opening large enough to receive all the roots in their natural position should be made. Adjust the roots so that they will occupy about the same position as they did in the nursery, and, with the hands, work the soil in and around the roots. After three or four or inches of soil have been placed on the roots, tramp firmly and fill up, leaving the ground a little lower around the collar of the tree. Trees ought to be set an inch or two deeper than they stood in the nursery. When trees are set so as to lean southwest 40 or 45 degrees, it will prevent, in a measure, the trunks from sunscald.

*Age of the Trees.*—Two-year-old trees are the best. Never plant any that are older; a one-year-old is better than a three-year-old tree.

*Varieties for Family Use.*—For summer, about an equal number of each of the following: Carolina June, Early Harvest, Cooper's Early, Duchess of Oldenburg.

For autumn: Maiden's Blush, Rambo, Lowell, Jonathan, Grimes's Golden.

For winter: Ben Davis, Missouri Pippin, Winesap, Rome Beauty, Smith's Cider, White Winter Pearmain, Stark, York Imperial, Willow Twig. This list might be extended somewhat further for each of the three consecutive seasons, but with my ex-

perience this is sufficient. All of the varieties named have been grown, and yield fairly well in southern Kansas.

*Commercial Orchard.*—All of the conditions as so far named for family orchard will apply to the commercial orchard, except the number of varieties to be used. It makes but little difference whether the plantation be large or small, but very few varieties ought to be planted, and of these 90 per cent. should be winter fruit.

For summer: Cooper's Early and Duchess of Oldenberg.

For autumn: Maiden's Blush and Lowell.

For winter: Ben Davis, Missouri Pippin, York Imperial, White Winter Pearmain, and Jonathan for early winter.

*Pruning.*—There is perhaps no one point in the growing of the apple on which there is so much difference of opinion as in regard to pruning. My experience teaches me that pruning is an absolute necessity, from the time of the tree's first year's growth in the nursery until it has outlived its usefulness. Pruning, if done right, will be found beneficial. A tree that has been properly handled in the nursery will need but little pruning the first season. The second year limbs should be allowed to grow on each side of the upright shoot, six or eight inches apart, alternately on each of the different sides of the tree as much as possible. All others either rub or cut off. The tree should be headed 18 to 20 inches from the ground. All water sprouts should be kept cut out, and no limbs allowed to cross each other. Keep the tree in such shape that when it comes into bearing no large limbs will need removing.

*Cultivation.*—This should begin as soon as weed seeds germinate, by harrowing both ways between the rows; then cultivate with a double-shovel plow with a short singletree, so the horse can work as close to the trees as possible, but not too deep. Corn is the best crop to grow in a young orchard; four feet each way from the tree is close enough for the corn to stand. Repeat the above process of cultivation once or twice after the corn is up, then the corn cultivator can be used on the corn and the double-shovel around the trees. Continue the cultivation of the trees, after the corn is laid by, as long as weeds continue to grow. The hoe should be used to remove all the weeds near the tree that the plow failed to kill. This treatment should be kept up each season, except as the trees get larger the corn can be planted somewhat farther from the trees.

The ground between the rows should be plowed each spring with a stirring plow, throwing the soil toward the trees, and then from them the next time. After the trees come into bearing no more corn should be planted, but continue the cultivation. When the orchard begins to bear heavy crops of fruit, give it a liberal application of well-rotted barnyard manure every alternate spring. Never sow any small grain in the orchard.

## MISCELLANEOUS DEPARTMENT.

## MUCH-NEEDED EXPERIMENTS.

BY M. ALLEN, HAYS CITY, KAS.

Within the past 40 or 50 years, vast progress has been made in developing new sorts of flowers, small fruits, and culinary vegetables. Even new races have been developed. Since the introduction of the tomato as a culinary vegetable, about 50 years ago, continual improvement has gone on in its good qualities. The advent of the Early Rose, about 35 years ago, was the beginning of a revolution in potato culture. Somewhat similar remarks might here be extended to the whole catalogue of not only culinary vegetables, but flowers, flowering plants, and shrubs. The bringing out of the old Wilson's Albany was the beginning of a new era in strawberry culture, the Concord in grape culture, and the Hale's Early in peach growing.

While much effort has been expended in hybridizing and crossing, with the hope, in all cases, of obtaining one or more of the good qualities of both parents, the weakest points of these parents have generally cropped out in the progeny; and, if I mistake not, the greatest achievements in all these lines have come through careful selections of accidental seedlings, sometimes resurrected from some old hedgerow or an old and abandoned field, but oftener from the planting of the most carefully-selected seed.

But since the tendency of all things is backward or downward, toward degradation and ruin, the production of sorts inferior to the parents is the rule, and superiority the exception. Whenever an exceptionally good thing appears, it is usually hailed as a bonanza; but alas! how often only for the locality of its origin, for most of them drop out of sight when removed to other soils, or sink into oblivion upon being removed to distant localities.

Among the annuals a good thing may appear one year, to either drop out or be supplanted by a better the next year; and for biennials, only one or two years more are necessary to determine their status. For the strawberry, grape, and peach, five or six years will usually suffice to establish their value or to determine upon their rejection in any locality.

We may justly congratulate ourselves upon the very rapid progress that has been made within the memory of the oldest of us; and now that we are coming near the close of the nineteenth century, we can fairly come to the conclusion that the greatest horticultural need of the time is just such a development in sorts of apples, pears, plums and cherries as we have had in things before mentioned. It is the shorter lived and more transient that we have been the most proficient with; now, let us give a fair share of our attention to the longer lived and more permanent, or such as it takes a longer time to get results from; and if we can, by any possibility, take any "short cuts" or "bee lines" to get them, let us not overlook these.

Many fallacies have crept into and obtained a foothold, even in some of our most respectable publications, and are generally believed in by even otherwise well informed people; such as mulching bearing trees while the ground is frozen, to retain the cold and thus retard blossoming; the blossoms or pollen from one sort affecting

the size; shape, color and quality of another sort which happens to be close to it; the influence of stock upon tree; that the stock influences the cion or bud that may be put upon it; that the result is a difference in the season of ripening, the color, shape and quality of the product. Close criticism will show that, when the atmosphere and sunshine are favorable, the buds will burst and leaves and blossoms will put forth, regardless of the conditions of the soil about the roots of the tree.

The bloom of one sort affects only the seed of an adjacent sort, and not the fruit itself; and the cion or bud is only a continuation of the tree from which it is taken, regardless of the stock or root it may be worked upon. Each sort has its own peculiar roots, and they are governed by the top, or, more closely considered, by the *leaf*. Each sort has its own peculiar leaf, and no two sorts have leaves alike; and, when examined by a good magnifying glass, they will probably be found no more alike than individual men, horses, or cattle. Indeed, I apprehend that the leaves of various sorts of trees are as dissimilar as the fruit they bear. Why does one tree produce red apples, another green, and yet another yellow? Or why is one sweet, another sour, and still another subacid? Whence come all these variations and intermingling of colors and flavors that we know to exist? Are not these conditions all dependent upon the size, shape and other configurations of the leaf, or the power of the leaf to draw from the atmosphere the required elements for the perfection of the fruit of each sort, according to the law of its being?

If it be found that these questions can be answered in the affirmative, then it follows that an expert microscopist may learn to tell the true character of the tree from the leaf it bears; and not only tell from a close examination of the leaf of any particular variety its size, shape, color, quality and season of ripening of the fruit, but also the adaptability or want of adaptability of such variety to any particular locality, when the average and variation of temperature and other meteorological conditions are known. Could the true law upon this subject be discovered and faithfully interpreted, the true character of the fruit of the future tree or plant could at once be delineated from the leaf of a seedling of a few months old, and thus would be given a very laudable desire to withhold certain promising seedlings from the grafter's knife; also, a great impulse would be given to the planting of choice seeds of the several species it was the most desirable to improve. New sorts of apple, pear, plum and cherry would come as easily in the future as the strawberry, grape and peach have done in the past.

Moreover, could this law be found and enforced, it would save much time and work that are now wasted, even upon biennial plants, as well as of cultivation, waiting and watching for the product of our most valuable sorts of fruits.

The general law of nature is that *each part is an index to every other part*; in animal life this law is already pretty well understood; so that the leading thoughts of an individual (when uninfluenced by education or other external circumstances) can be quite clearly and correctly determined by the shape of the brain or the cast of countenance. Or, in comparative physiology, the expert student in that science can, if a single bone of an extinct species be submitted to him, reproduce quite correctly an outline of the original, or describe with minuteness a strange bird, with only a single feather for an index.

The object of this paper is to have this same law developed as to the vegetable kingdom, and to find the young man who is willing to undertake the work—if failure is the result, only a little more wasted time can be recorded and added to the vast volume that has preceded it. If success in delineating the law (which, I think, is only waiting for development or discovery) should crown the efforts of the investigator, the event may be recorded as one of the most useful of its time.







FIG. 32. THE EFFECT OF MULCH UPON TWIG OF GOOSEBERRY.  
(See page 141.)





FIG. 33. BRANCH OF A NECTARINE TREE. (See page 142.)

## DOES MULCHING RETARD THE MATURITY OF FRUITS?

BY PROF. L. H. BAILEY, AGRICULTURAL EXPERIMENT STATION, ITHACA, N. Y.

[Bulletin No. 50.]

It is the general opinion that a mulch or heavy cover placed upon the soil about plants when it is frozen will retard flowering and the maturing of fruit; yet the practice appears to be often unsatisfactory, and there are reasons for supposing that the philosophy of the subject is not commonly understood. The subject is one of increasing importance, for every effort must be made to reach the market when there is least competition from other sources, and, in New York, at least, this competition comes chiefly from early products produced in states to the southward. It is also essential that every means be used to escape the late spring frosts which kill the flowers. Careful experiments upon the effects of mulches were made at this station this year, and to the rehearsal of which I also append some general considerations.

The last winter was severe at Ithaca. The ground froze deep in December, and the frost did not leave it until the middle of March. Upon the 28th of February, 1893, the snow being well settled and a foot or more deep in the open fields, heavy mulches, of coarse manure and litter from horse stables, were placed about apples, almonds, buffalo berries, blackberries, raspberries, currants, gooseberries, grapes, juneberries, peaches, and quinces; and strawberries were mulched later. Observations were also made upon roses which were mulched in the fall for winter protection.

The apples and other tree fruits comprised trees which were set in the spring of 1889. Half of a large wagon load of mulch was placed about each tree, covering the snow deep for a distance of three feet or more in all directions. The small fruits were mulched heavily to the middle of the rows, or three and a half to four feet in each direction. A heavy wagon load of mulch was sufficient to cover about 10 feet of row. On the 29th of March, these mulches were examined, and, although the frost had left the fields fully 10 days before, the earth under the cover was still solidly frozen, and from six to eight inches of snow existed. Here, then, was an excellent opportunity to study the effects of a cold soil upon the vegetation of plants. On the 13th of April there was still frost and snow under the gooseberry mulches, and yet both mulched and unmulched plants seemed to be starting alike. It was apparent that the temperature of the soil exerted no influence upon the swelling of the buds, for the buds which projected above the mulch were as forward as those upon untreated plants, while the buds immediately under the mulch, upon the same twig, were wholly dormant. The illustration (Fig. 32) shows two gooseberry twigs arising from a common branch, in which these differences are apparent. The twig upon the right was under the mulch, and is completely dormant. That upon the left was covered, up to the point indicated by the string. The protruding portion is seen to have pushed its buds forward, save at the very tip, where the shoot was winterkilled. Shoots of which the tips were caught under the mulch showed perfectly dormant buds at both ends, while the protruding middle portion was as forward as twigs upon unmulched plants. Moreover, the protruding portions of the mulched plants maintained their forwardness, and produced leaves, flowers and fruit at the same time as the contiguous plants which were not treated. Crandall currants, juneberries, roses, grapes and all the tree fruits behaved similarly throughout the season. The mulched blackberries, raspberries and Victoria currants seemed to be a day or two behind the others in starting, but they very soon caught up, and there was no difference in season of bloom and maturity of fruit.

With the strawberries the case was far different. General Putnam and Oregon

Everbearing were mulched March 25, when the ground was completely thawed out. The mulch covered the plants and the entire space between the rows to the depth of three inches. On the 15th of May, this mulch was removed. At this time, the unmulched plants were in full leaf and were nearly ready to bloom. The plants under the mulch were just starting into leaf and the growth was weak and bleached. The plants were endeavoring to push themselves through the cover to the light and air. The mulch was forked off the plants, and they gradually assumed a normal color and habit, and bloomed June 1. The bloom was delayed from 10 days to 2 weeks, according to the depth of the covering. The plants did not seem to recover entirely, however, and the fruitage was somewhat lighter than on the normal plants; but it was delayed about a week.

All this is what the botanist would have expected. It is well known that plants store up starchy matters in their bulbs or branches, to be used in the growth of the adjacent parts in early spring. The earliest bloom of spring is supported by this store of nutriment, rather than by food freshly appropriated from the soil. This is well illustrated by placing well-matured twigs of apple or willow in vases of water in winter, when the buds will burst and flowers will often appear. It was admirably enforced by a simple experiment which we made last winter in connection with this inquiry, and which is illustrated in the engraving (Fig. 38). On the 15th of February, a branch of a nectarine tree which stood alongside the horticultural laboratory was drawn into the office through a window. This office was maintained at the temperature of a living room. On the 6th of April, the buds began to swell, and the young leaves had reached a length of three-fourths inch a week later. The leaves finally attained their full size upon this branch, before the buds upon the remaining portion of the plant had begun to swell. This condition is shown in the illustration. This experiment is by no means a novel one, for essentially the same thing has heretofore been accomplished with the vine and other plants; but it must impress upon the reader the fact that much of the bursting vegetation of spring-time is supported by a local store of nutriment, and is more or less independent of root action.

These various experiments and observations show that a mulch can retard flowers and fruit only when it covers the top of the plant as well as the soil. If the ground could be kept frozen for a sufficiently long period after vegetation begins, the plant would consume its supply of stored food and might then be checked from inactivity of the root, but this would evidently be at the expense of injury to the plant; but, in practice, it is fortunately impossible to hold the frost in the soil so long. It is evident, too, that the covering of strawberries and other low plants for the purpose of retarding fruit must be practiced with caution, for a mulch of sufficient depth to measurably delay vegetation is apt to bleach and injure the young growth, and to lessen the crop. Yet it can sometimes be used to good effect, and fruiting can be delayed a week, perhaps even more. I have obtained the experiences of various horticulturists in mulching strawberries to retard bloom and fruit.

#### CONCLUSIONS.

1. The early bloom of fruit plants depends very largely upon the appropriation of food stored in the twigs, and it is more or less independent of root action. This is proved both by direct experiment and by study of the physiology of plants.

2. It must follow, then, that the temperature of the twig or branch must be reduced if its vegetation is to be much retarded; or, in other words, the top of the plant, as well as the soil, must be mulched, and in practice this is possible only with strawberries and other very low plants, or those which are laid down during winter.

3. There is danger of injuring plants by heavy mulch which is allowed to remain late in spring. If it is desired to retard flowers or fruit by mulching, the practice should not be violent and the plants should be carefully watched.

4. Many strawberry growers are able to delay the ripening of fruit, by mulching, from two days to two weeks; but a week's delay is usually about the limit of profitable results.

### A HEALTHY FOLIAGE ESSENTIAL TO A SUCCESSFUL FRUITAGE.

BY DR. THOS. MEEHAN, BOTANIST, GERMANTOWN, PA.

It is wholly healthy foliage that will give full crops. Whenever grain loses its leaves before the ears mature, the crop is lessened. An excellent lesson can be had from two hills of corn. Commence to denude the plant of foliage before the silk or tassel forms, and watch the result on the crop. Even those who believe they understand the value of attention to these matters will be surprised with the force of lessons like these.

It has recently been placed beyond all doubt that the continual injury to the foliage of the strawberry by the work of a fungus, which spots the leaves, is what proves the continual degeneracy of varieties. The hundreds of new varieties of strawberries that have been introduced during the past quarter of a century have not given us in any respect better kinds than we then had, but they take the place of kinds that degenerate. When half the leaf blades are destroyed by the spot, the plant has only half the leaf surface it should have, and suffers proportionately. New seedlings are usually several years before they get the spot. The Sharpless is said to have resisted the attack longer than any other variety. The methods of culture, necessary though they be, lower the vital power to resist the spot. It is said that the strawberry in its wild state is able to resist the spot.

Another instance of the value of foliage is illustrated by the early fall of the leaf of the pear or other trees from the leaf fungus, from caterpillars, or from other causes. It is well known that the fruit will not then ripen well.

Perhaps one of the best illustrations is the loss of leaves on the potato plant by the Colorado beetle, when all know no crop is returned to us.

It is impossible for a plant to continue long without healthy leaves. We can turn this principle to good account in the destruction of weeds, and to good account, also, by doing all we can to keep the foliage healthy in the crops we grow.

### CAUSES OF FAILURE IN TRANSPLANTING.

Why do trees with an abundance of fibrous roots often fail, for all the best care in transplanting, while frequently the same trees with sprouting roots did well? It does not seem to be generally known that the fibers of a tree are the weakest part of the root system. It should be stated that the underground or root system of a tree is, in many respects, but the analogue or counterpart of the portion above ground. The two systems are founded on the same plan, but slightly modified. The young, soft shoot becomes a trunk, while the same structure, pushing down, becomes a tap root. Side branches with leaves push from the trunk, the leaves performing an important part in feeding the tree. The side branches of the roots with fibers do just the same thing. The leaves work only one season and die, and just the same do the fibers. They die annually, just as the leaves do. One may see how this is by looking at the fibers of an English ivy, a trumpet vine, or a poison vine, by which they are attached to something to climb by. None of them are over a year old. The living and dead fibers are all intermixed. Once in a while one of these fibers will

get into a cleft of rotten mortar, or into a crevice of dead wood, and then, instead of an annual fiber, it becomes a permanent root. We thus derive a double lesson. First, that roots are annual, and second, that a fiber that would, under ordinary circumstances, have but a year of life, becomes a permanent root when circumstances favor a more than usual supply of nutrition. The same progress goes on under ground as we see above. The fibers all die before the 12 months expire, a few only becoming permanent roots among the whole mass.

Another point is worth remembering. If we cut off a branch and place it in water, it will draw in some water, and live for a while, but, unless it sends out new fibrous roots, it will not live long. And just so with a tree. It can take in a little moisture through the surface of old, hard-wooded roots, but the roots have to make new, active fibers before it can make much headway. It is indeed from the extreme white points of active, growing fibers that the tree derives its chief support. The old fibers, moved with the transplanted tree, have but little vital power. They make the white, growing points only with difficulty, and hence are of little value. The fibers that have had vital power to go beyond their original annual condition, and are destined to become the permanent roots of the plant, are the ones the tree planter should desire. And these are of value in proportion to their growth and vigor. If a mere annual fiber is of little value, so also are of little value old, coarse, hard-wooded roots that are also sluggish as regards vital energy. If a planter can get a tree with a large portion of real roots, of two, three or four years old, removal has the almost absolute certainty of success.

We see from these principles why large trees are often as great failures on transplanting as trees with a great mass of annual fibers and few vigorous real roots. There is little else than a mass of hard, old stubs that with difficulty push out growing, white fibers. The endeavor to move such with a large ball is therefore often an expensive failure. We have saved a large ball of earth, but it contains little worth having. The two, three or four-year-old roots are usually cut off and left in the ground in order not to have too heavy a ball. Occasionally a large tree, so moved, will live and thrive fairly well, but then only because there have been a few young and vigorous roots among the older stubs. These large trees moved with a ball, but without vigorous roots, almost always put out leaves the first season, and so will some trunks of trees when chopped down and no roots at all to feed them. This comes mainly from feeding on the sap stored in the tree. They usually gradually die away completely within a few years. But if a large tree can be moved so as to carry with it a large number of comparatively young and vigorous roots, there usually follows the same success as follows the removal of younger trees.

#### POLLINATION OF PEAR AND APPLE BLOSSOMS, ETC.

BY PROF. B. T. GALLOWAY, OF THE DIVISION OF VEGETABLE PATHOLOGY, DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

In the experiments of the division to determine a treatment to prevent pear blight, the bagging of the flowers with mosquito netting successfully prevented blight, but it was discovered that such protected flowers failed to set fruit. This plainly indicated a fact hitherto generally overlooked by horticulturists, viz., that certain well-known horticultural varieties of pears, such as Bartlett, Anjou, Winter Nelis, etc., are incapable of self-fertilization. In other words, in order to secure a good crop of fruit on any of the foregoing trees, it was necessary for their flowers to receive pollen from some other variety.

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In the spring of 1890, and thereafter at frequent intervals, the division received complaints from the firm of Franklin Davis & Co., Baltimore, Md., to the effect that a large pear orchard, owned by the Old Dominion Fruit Company, and situated on the James river, near Scotland, Va., had for a number of years been unfruitful. It was thought by Mr. Davis that the unfruitfulness might be due to blight attacking the flowers or to diseases affecting the trees. Early in the spring of 1892, Mr. Waite, of the division, was authorized to investigate the cause of the trouble. It was found that the orchard consisted originally of 20,000 standard Bartlett pear trees, about five-sixths of which were still living. The orchard was planted 17 or 18 years ago, and, although yielding fairly remunerative crops for the first few bearing years, it has been almost a dead loss during the past six or seven seasons. Several diseases were found in the orchard, blight being among the number. The general failure of the orchard, however, could not be satisfactorily accounted for by these causes; consequently attention was turned to the pollination of the flowers. A large number of the flowers were bagged and many others were pollinated by hand. The hand pollinations consisted in the application to the pistils of pollen from the following sources:

1. From the same flower.
2. From another flower of the same cluster.
3. From a different cluster on the same branch.
4. From another tree of the same horticultural variety.
5. From another tree of a different variety.

The flowers in the foregoing experiment had all their stamens removed previous to hand pollinations.

The results of this work, although carried on with a comparatively small number of blossoms, agreed with those obtained the previous year, at Brockport, N. Y. No fruit whatever was formed where Bartlett pollen was applied to its own pistils, even though it was taken from a separate tree. On the other hand, wherever the pollen of another variety was employed, a high percentage of fruit was obtained. There seems no reason to doubt that the unfruitfulness of this large orchard is due largely to its isolation, and to the fact that it consists, with less than a dozen exceptions, of Bartlett trees, which are incapable of self-fertilization. In other words, there is not sufficient pollen of the right kind in the orchard or in the neighborhood to fertilize the immense number of Bartlett flowers, and, consequently, little or no fruit is formed. The remedy in this case seems to be simple, viz., the introduction of other varieties, either by planting or by top grafting, or by both.

In order to corroborate the results obtained in Virginia, Mr. Waite was sent to Rochester, N. Y., immediately after his return to Washington. Rochester was reached before the pear flowers had begun to open, and a large number of experiments along the same line as those in Virginia were begun.

In addition to the work at Rochester, similar experiments were carried on with apples at Brockport, N. Y.; also at Geneva, with both apples and pears, by Mr. Fairchild. As a result of all this work, it was shown that about two-thirds of the commonly-cultivated pears are more or less incapable of self-fertilization. In the case of the apple, the well-known varieties seem to be more commonly self-sterile than the pear. An examination of cross- and self-fertilized fruits shows sufficient differences to enable one to decide that the latter rarely occur in nature, and that even those which are capable of self-fertilization are generally cross-fertilized, or might even be said to prefer foreign pollen. The cross- and self-fertilized fruits are frequently quite different in appearance. The difference in the size and number of the seeds is still more striking.



The practical application of the foregoing principles will be plainly apparent to horticulturists. For example, large, solid blocks of varieties known to be wholly or partially self-sterile should not be planted without introducing kinds known to be active fertilizers. Of course, judgment must be exercised in the selection of pollinating varieties; otherwise there may be discrepancies in the time of blooming which will render them valueless, so far as the object in view is concerned. Careful tests will also be necessary to ascertain what varieties have pollen of the greatest potency for the fertilization of the sorts which it is wished to grow.

### THE PEAR-BLIGHT MICROBE.

BY PROF. M. B. WAITE, DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.  
[Extracts from a lecture before the Delaware Peninsula Horticultural Society, 1892.]

The first published record of pear blight is by William Denning, in 1794, who saw the disease in pears on the highlands of the Hudson. The disease was known at Philadelphia before the beginning of the present century, and has, since then, been more or less troublesome in that vicinity.

The disease is identical in the pear, apple, quince, Siberian crab apple, and also occurs on our native, wild crab apple, hawthorn, mountain ash, and service berry, all members of the suborder *Pomeæ*, of the rose family. The malady is generally conceded to be the worst disease of American pomaceous fruit trees. It is not a foreign importation, as are the fruits themselves, and seems to be limited to the continent of North America. It was no doubt originally a disease of our native crab apple and hawthorns, and when the comparatively tender pears and apples were grown here, the disease readily attacked them, doing greater damage than to the native trees. Pear blight is now known to occur practically all over the United States and the fruit-growing region of Canada and British Columbia.

The discovery of the bacterial nature of this disease by Professor Burrill, of Champaign, Ill., published in 1880, marks the most important event in the history of the disease. Professor Burrill announced that the disease was due to an exceedingly minute parasitic plant, of the class known as bacteria, which his microscope showed to swarm in immense numbers in the blighting twigs. He named the organism,\* and demonstrated its connection with the disease by a series of inoculation experiments.

Pear blight is a disease limited to the tender, growing parts of the tree, to the young shoots and flower clusters, and, on the older branches, to the fleshy portion of the bark. The disease never works in the wood, as is often stated, but limits itself to the bark. The bark is really the vital, living part of a branch, and when that is killed the limb is dead. The disease always gets a start in the tender, growing tips or flower clusters, and runs downward from them into the larger branches. This disease often runs down a small twig or a fruit spur located on a large limb and spreads out, forming a circular or elliptical patch, with the twig in the center. In the majority of cases where blight is running down a twig, it comes to a standstill of its own accord. But for this fact we could scarcely grow pears, for one single infection would destroy a tree. In some cases, however, this occurs.

If a small bit of blighted bark or the gum which exudes from it be placed in water and examined under the microscope, millions of the tiny bacteria can be seen swarming out of it. These germs may be cultivated in a pure state in plugged test

\* *Micrococcus amylovorus*.

tubes, and, upon introducing them into a growing twig or young fruit of the pear, it will produce the disease. The most important recent discoveries have been concerning blight in the flowers, or "blossom blight." It was found that the microbe multiplies rapidly in the nectar or "honey" of the flowers, and from the nectar the germs are able to enter the nectaries of the flowers and so get their start inside the tree. Insects visiting the flowers get this nectar swarming with germs attached to their mouth parts and feet, and in that way carry it from flower to flower.

In the course of the experiments, flowers were infected by spraying on the germs in water with a small atomizer. Flowers so infected invariably break down with pear blight. If insects are allowed free access to these blighting flowers, they spread the disease to those adjacent. But a mosquito net bag was found to be a perfect protection to the flowers from blight, showing that the germs were not carried from flower to flower by the wind, but only by insects. In this way, an artificial epidemic of pear blight on a small scale was started in an orchard at Brockport, N. Y. At the other end of the same orchard, trees were infected in the same way, and afterward sprayed with fungicides, to see whether an infected tree could be disinfected. The result was entirely satisfactory. Twenty trees were infected and treated, and from 98 to 100 per cent. of the blossom clusters remained sound, while on a control tree (tree not treated) they were all destroyed. We must not jump at the conclusion at once that we have here a practical remedy for pear blight. These treatments were made on trees that were known to be infected only an hour or so before, and are encouraging, but that is all; and we still have to admit that there is no practical remedy known for pear blight, but the possibilities of treatment lie along four different lines:

*First*, Selection of varieties and methods of culture. Varieties should be grown which have been found to suffer least from this disease, and an even, steady growth should be aimed at. Avoid nitrogenous manures, or use them sparingly, and do not change the culture so as to start the trees into an unusually-rapid growth.

*Second*, Manner of pruning. The trees should be trained so that fruit spurs and young twigs, which are liable to start the disease, do not occur on the large limbs or near the main parts of the tree.

*Third*, Carefully watch the young growth and blossoms as they come out in the spring, and cut out below the disease as fast as it appears.

*Fourth*, Prevent severe epidemics of blight, especially blossom blight, by spraying the trees with fungicides. In the experiments on treatment, a 3-per-cent. solution of chloride of lime gave absolutely perfect results, but scorched the foliage slightly. It is possible that a 1-per-cent. solution would have produced the same beneficial results without injury to the foliage. Bordeaux mixture and ammoniacal solution of carbonate of copper were the other fungicides used, and gave good results. It is thought, however, that other fungicides than those in common use for pear-leaf blight, black rot, scab, etc., will be found by experiment to be best for pear blight.

## EXPERIMENTS AND SUCCESS WITH THE POTATO IN 1892.

REPORT FOR SOUTHERN KANSAS, BY H. A. EABHART, OXFORD.

This has been a precarious season for the garden. The long, cold spring retarded the germination of seeds, thereby giving the weed seeds a chance to crowd the vegetable planting. It was only by persistent effort and frequent replanting and constant weeding that the amateur or expert gardener succeeded with the garden. Most private gardens were not a success. The professional gardener succeeded

in growing a fair crop of vegetables, for which he had a good market at remunerative prices.

In this report I shall endeavor to advance some new ideas in regard to that indispensable and universally-used tuber, that graces the table of rich and poor alike, the potato. In experiments made during the past eight years, I have come to the conclusion that the reason the potato is not a general success in southern Kansas is owing to the fact that the seed usually planted does not possess sufficient vitality to make a vigorous growth and mature perfect tubers. Almost all of the seed used here is shipped from distant points, and by careless handling it oftentimes has lost much of its vitality. Everyone who wishes to grow this crop successfully should raise his own seed. I propose to give a plan by which everyone can raise seed that is full of vitality and that will always produce a crop of large and perfect potatoes.

Plant Early Ohios or any other early variety, and as soon as matured, or before they are done growing, dig and sun-dry them for about 10 days (you must not expose them to the full heat of the hot summer's sun or they may scald, thus rendering them unfit for the purpose). Do not cut the tubers, but plant whole, in freshly-turned soil, and keep free of weeds, and the crop they produce will be worth, for seed the following spring, \$5 a bushel, where the best seed usually planted would not, in comparison, be worth 50 cents. Cutting a new potato and planting it stops its germination; very few would come up.

I have planted as late as the 9th of August and succeeded in growing a good crop, from the size of a pea to a hen's egg. The smallest is as valuable as the largest. It does not matter whether the tubers are matured when frost comes. Dig them and give them a good sun-drying, after which you can store for the winter. They will never sprout like other potatoes, thereby losing a greater part of their vitality, but will come out fresh and clean in the spring—a perfect seed—one that will insure a full crop of perfect tubers.

When you plant this seed, cut to two eyes, no matter how small the potato is, and drop two pieces at each place; tend well, and when they come into blossom you will be amazed to see the blooms. If you desire a very late crop of large potatoes, do not plant this seed until July.

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## THE OPPORTUNITY.

BY J. L. M'CLURE.

Just now is a splendid time for Kansas farmers and fruit growers to look around them and consider that, after the few recent failures in fruit crops (mainly the apple), this is not the time to quit raising fruit or trying to raise it. If there is a failure in corn or wheat, who ever heard of that same field lying idle because it failed last year? Or if the corn was a poor stand, who ever heard of a man being so silly or discouraged as not to replant? The same is true of orchards. Do not make cow pasture and firewood of the fruit trees because we have had a scarcity of fruit for a season or two. If it pays well to replant corn, it pays better to replant in the orchard, or, at least, to plant new trees as fast as the old ones die out. Now this is just the time for wide-awake, pushing, energetic men to take advantage of the times and *plant* and *manure* and *cultivate* and *prune* and *spray*, and be up and *doing*, while the fossils are grumbling, and saying, "It takes *work* to get a fruit crop." Certainly it takes work. Did anyone ever get a crop of grain or potatoes without *work*? I think not; and *more* work and *harder* work and more of it than the successful man has with his money-making fruit crop? The orchard is too often an index to the

character and circumstances of the proprietor. The writer has within a year visited hundreds of the *best* farms and orchards in the state of Kansas, and, from the appearance of many of these farms, the question has often arisen, What is wrong at this or that farm or home? In nine cases out of 10, you can tell where the *thrifty* man lives by the trim, neat appearance of his grounds and orchard. He orders a supply of fruit trees, vines, etc., because he has made and *is* making money on fruit, and knows how to keep it up. And when his order is solicited he does not waste time by inventing false excuses, for he wants trees and *knows* the laggards will lag behind still, and by planting a good tree and giving it proper attention he will raise fruit and sell it to those fossils and *pocket their hard cash* with a satisfied smile, and thrive and live in plenty, and have *the salable farm* in his own neighborhood. Some say the experience you buy is the best and cheapest. That is true in many things; but, in selecting varieties of Kansas-grown stock for planting, there is no more experienced and safer guide than our own Kansas (Horticultural) Biennial Reports. And I am sorry to state, and I believe *truly*, that not one Kansas farmer in 10 belongs to his county horticultural society and reads its reports, and reaps the reward he could get at a very trifling cost, and learns from these books the practical experience of hundreds of men. Now, friends, this is *not* the time to be discouraged. We must be up and doing. We must plant and manure and cultivate and prune and spray, and must rustle. *And then*—

“We'll never know want, for we live by our labor;  
We'll reap what we plant, for the soil is our own;  
We'll spread hospitality's board for the stranger,  
And care not a fig for the king on the throne.”

## COUNTY FRUIT REPORTS FOR 1893.

These reports have been compiled from answers to the circular following. All synonyms have been rejected, and the nomenclature has been arranged to conform to the catalogue of the American Pomological Society and Downing's "Fruit and Fruit Trees of America."—SECRETARY.

[CIRCULAR NO. 1—1893.]

SECRETARY'S OFFICE, KANSAS STATE HORTICULTURAL SOCIETY,  
LAWRENCE, KAN., July 21, 1893.

DEAR SIR: You are kindly requested to accept the appointment and to act as Vice President for your county during the year 1893, and to give your attention to the following questions relating to its horticultural interests, and to report to this office, by November 1, following, as complete answers thereto as practicable. By the provisions of the Society's constitution, each person thus serving is entitled to an annual membership and a copy of the Society's report.

Very truly, G. C. BRACKETT, Secretary.

### ORCHARDS.

1. What is the present condition of fruit plantations in your county? Apple, cherry, peach, pear, plum, quince.
2. What varieties are in best condition? Apple, cherry, peach, pear, plum, quince.
3. What varieties are declining, and the age of such trees? Apple, cherry, peach, pear, plum, quince.
4. What is the evident cause of decline? Apple, cherry, peach, pear, plum, quince.
5. What new varieties have been introduced that are promising? Apple, cherry, peach, pear, plum, quince.
6. What varieties have been fully tried, and rejected, or fail to give satisfaction? Apple, cherry, peach, pear, plum, quince.

### VINEYARDS.

7. What is the present condition of plantations of bearing age?
8. What was the character of cane growth in 1892, and in what condition when winter set in?
9. Was black rot prevalent on the fruit in 1892? If so, were any means used to prevent its development?
10. What varieties are most successful?
11. Which of the newly-tried sorts are promising to be desirable?

### SMALL FRUITS IN 1893.

12. What was the condition of plantations? Blackberry, currant, gooseberry, raspberry, strawberry.
13. What varieties are most successfully grown? Blackberry, currant, gooseberry, raspberry, strawberry.
14. What varieties are most profitable for marketing purposes? Blackberry, currant, gooseberry, raspberry, strawberry.

### CROP REPORT FOR 1893.

#### ORCHARDS.

15. Was the crop heavy, medium, or light? Apples, cherries, peaches, pears, plums, quinces.
16. Was the quality good or poor? Apples, cherries, peaches, pears, plums, quinces.
17. What proportion was marketable as first and second class? Apples, cherries, peaches, pears, plums, quinces.

#### SMALL FRUITS.

18. Was the crop heavy, medium, or light? Grapes, blackberries, currants, gooseberries, raspberries, strawberries.
19. Was the quality good or poor? Grapes, blackberries, currants, gooseberries, raspberries, strawberries.

20. What proportion was marketable as first and second class? Grapes, blackberries, currants, gooseberries, raspberries, strawberries.

#### INSECTS.

21. Have the Codlin Moth (apple worm), Plum Curculio and Apple Curculio been as prevalent in 1893 as in former years?

#### SPRAYING WITH INSECTICIDES.

(London purple, Paris green, and kerosene emulsion.)

22. Has this method of treatment for the prevention of insect damages been used? If so, with what results?

#### SPRAYING WITH FUNGICIDES.

(To prevent injury from attacks of apple scab, rust of raspberry and blackberry canes and their leaves, sometimes erroneously called summer- or winterkilling, and black rot of the grape.)

23. Has this method of treatment been used to prevent the diseases above named? If so, with what results?

## NORTHERN FRUIT DISTRICT.

### CLAY COUNTY.—By E. F. WALTER, WAKEFIELD.

ORCHARDS.—Condition: All classes of fruit trees are in a healthy condition, and, judging from the abundance of fruit buds, promise a heavy crop of fruit in 1894.

Of apples, the Yellow Bellflower, Red Astrachan and Carolina June are placed on the rejected list, after a full trial, as unsatisfactory.

VINEYARDS.—Owing to the great heat and drought prevailing through July and September, the present condition of vines in this locality is not satisfactory. Black rot was not prevalent in 1893.

SMALL FRUITS.—Condition: Blackberry, very good; raspberry, Souhegan and Gregg, fair, red varieties, poor; strawberry, poor.

Varieties most successfully grown: Blackberry, Snyder, Stone's Hardy; raspberry, Souhegan, Gregg, McCormick, Turner, Golden Queen; strawberry, Windsor Chief, Miner, Crescent, Haverland, Jessie, Bubach No. 5, Gandy, Edgar Queen, Michel, Parker Earle, Warfield No. 2.

CROPS.—All classes of orchard fruits failed in a crop, excepting the English Morello cherry, which was fairly fruitful.

Small Fruits: The crop was light of all classes. Raspberries and strawberries were good; blackberries fair in quality.

Grapes were a light crop, and only fair in quality.

INSECTS were prevalent in 1893. Spraying with London purple to control the Codlin Moth produced excellent results in previous years. But Paris green did give satisfaction when used to suppress the Plum Curculio. Fungicides have not been used.

### CLOUD COUNTY.—By H. H. YOUNG, RICE.

#### (North half.)

ORCHARDS.—Condition: Some apple and cherry trees are in good condition, while others are not; peach trees are mostly dead or dying; pear, fair. Of apples, the Ben Davis, Winesap and Missouri Pippin are in the best condition.

Causes of failure: Apple, hail, sun scald, hot winds, and insects; cherry, sun scald and hot winds; peach, a borer in the roots; pear, blight; plum, hot winds.

VINEYARDS.—Vines of bearing age made a good cane growth, but the crop of fruit was very light, and of an inferior quality. Grape rot was prevalent on the fruit in 1892 in some plantations and not in others.

**SMALL FRUITS.**—Plantations of all classes are in very poor condition.

**CROPS** of all classes of small fruits, and of apples, peaches, and pears, were an absolute failure in 1893, and but little better in 1892; and fruit growing in this part of the county is not very promising at this time.

**INSECTS.**—The Codlin Moth and Apple and Plum Curculio were as prevalent as in preceding years. Spraying with insecticides did not give satisfactory results, owing to inexperience in the work or inefficiency of methods. Some made two applications, and are of the opinion that three sprayings would have afforded good results.

*(South half.—By Isaac I. Truex, Delphos.)*

**ORCHARDS.**—Condition: All classes of fruit trees are in good condition, excepting the pear, which is not of the best, and the quince, poor.

Varieties in best condition: Apple, Missouri Pippin, Winesap, Ben Davis, Rawle's Genet, Grimes's Golden, Early Harvest; cherry, Early Richmond, English Morello; peach, Crawford's Early, Alexander, Old Mixon, Amaden; pear, Kieffer, Angouleme, Seckel, Bartlett; plum, Wild Goose, Miner.

Varieties declining from age: Apple, none; several kinds, for instance, the Willow Twig, are very subject to injury from blight; cherry, peach, all varieties tried are short lived, and commence to decay at about 10 years old; pear trees have blighted badly during the last two dry years, and fruit growers are of the opinion that they cannot be satisfactorily grown in this locality; plum trees, even the oldest, are vigorous and show no signs of decaying.

Varieties fully tried, and rejected: Apple, Willow Twig, Rambo, Cooper's Early, Lowell; cherry, Common Morello.

**VINEYARDS.**—Condition: In 1892 the cane growth was moderately strong and well ripened, and the fruit was not attacked by the black-rot fungus.

Varieties most successfully grown: Agawam, Concord, Catawba, Niagara, Perkins, Goethe.

**SMALL FRUITS.**—Condition: Blackberry, injured by winter; raspberry, poor; all others, good.

Varieties most successfully grown: Blackberry, Kittatinny; currant, Red Dutch; gooseberry, Houghton; raspberry, Souhegan, Turner, Shaffer; strawberry, Charles Downing, Miner, Crescent, Captain Jack, Glendale, Mt. Vernon.

**CROPS IN 1893.**—Orchards: All classes were light excepting peaches, which were a fair crop. In quality, all were fair to good. About four-fifths of the apple and peach, and the entire crop of the cherry, were first-class product.

Small fruits: Currants, gooseberries and strawberries were a fair, and blackberries and raspberries a light, crop. In quality, all classes were good, excepting the blackberry and raspberry, which were poor.

Grapes were a fair crop and good in quality.

About 90 per cent. of the grape crop, 75 per cent. of the raspberry, and 95 per cent. of the strawberry crop, were marketable.

**INSECTS.**—The Codling Moth and Apple and Plum Curculio were as prevalent as in preceding years. Spraying with insecticides resulted favorably in some cases, and in others failed. Fungicides have not been used.

DECATUR COUNTY.—BY ISAAC CLARK, OBERLIN.

**ORCHARDS.**—All classes of fruit trees are in good condition. Of apples, the Red Astrachan, Maiden's Blush, Rambo, Rawle's Genet and Ben Davis are in the best condition, and are the most promising varieties. The Early Richmond cherry and Le Conte pear lead in their classes.

**VINEYARDS.**—The Concord is the most successful variety, and its present condition is healthy. Black rot has not developed in this locality.

**SMALL FRUITS** of all classes are in poor condition. Downing gooseberry, Gregg raspberry and Miner strawberry are successfully grown.

**CROPS** of all orchard fruits were light and poor in quality the present year.

Small fruits of all classes, and grapes, bore a light crop. In quality, the grapes and gooseberries were good; raspberries and strawberries, poor.

Neither insecticides nor fungicides were used.

**DICKINSON COUNTY.—By JAMES DUNLOP, DETROIT.**

**ORCHARDS.**—The present condition of all classes of fruit trees is good. The season has been favorable for a thrifty wood growth. Nearly all pear trees have been killed by the blight.

Varieties in best condition: Apple, Carolina June, Red Astrachan, Oldenburg, Maiden's Blush, Jonathan, Gilpin, Ben Davis, Winesap, Missouri Pippin; cherry, Early Richmond, English Morello, Common Morello; peach, selected seedlings; pear, Buffum, which resists blight the best of any; plum, Wild Goose, Mariana.

Nearly all varieties of apple trees begin to decline at 20 to 22 years old; cherry, Early Richmond, at 18, and Common Morello, at 15 years; peach, seedlings, at about 10, and budded sorts keep healthy to a greater age; pear, a few Buffums are living and tolerably healthy at 20 years of age; plum, at from 12 to 15 years.

The evident cause of decline with apple trees is mainly blight, and some is due to heavy crops in 1891; cherry and plum, the decline seems to be the limit of age; peach, overproduction of fruit in 1891, which killed, probably, two-thirds of all trees over eight years old; pear trees fail through attacks of blight.

New varieties which are promising: Apple, Babbitt, York Imperial, Delaware Red Winter, Yellow Transparent. The latter is liable to blight.

Varieties tried and rejected: Apples, Early Harvest, Willow Twig, Rambo, Rawle's Genet (bears well, but its fruit is very liable to rot on the tree), the Russets, Rhode Island Greening, Baldwin; cherry, all the sweet varieties; peach, very early sorts, including Amsden; Alexander, the fruit is insipid.

**VINEYARDS.**—Bearing age: Where properly treated, all are in excellent condition, the wood being thoroughly ripened. Black rot was not prevalent. The Concord and Worden are most successfully grown. The Empire State, recently introduced, is quite promising.

**SMALL FRUITS.**—Condition of plantations in the spring of 1893: Blackberry and currant, poor; gooseberry and raspberry, fair; strawberry, very good. The Red Dutch currant, Houghton gooseberry, Souhegan, Gregg and common wild sorts of raspberry, Wilson's Albany, Crescent and Warfield strawberry, are the most profitable varieties.

**CROPS IN 1893** — Orchards: All classes were very light, excepting the peach, which was medium. In quality, all classes poor, excepting peaches and pears, which were fairly good. One-half of the peach crop was first class, while of the others only second-class fruit was grown.

Small fruits: The crop of grapes and strawberries was medium; all others, light. In quality, all classes good, excepting blackberries and currants, which were poor.

Nearly all of the crop of grapes, half of the raspberry and 75 per cent. of the strawberry crop was first-class fruit.

**INSECTS.**—Codlin Moth and Plum Curculio were as prevalent as in preceding years. The Apple Curculio was not found. Very little spraying for the destruction of insects was done in 1893, but the results of such treatment in preceding years were very satisfactory. Fungicides have not been used.



DONIPHAN COUNTY.—By J. E. CAMPBELL, HIGHLAND STATION.

(North half.)

ORCHARDS.—Condition: Apple, peach (young trees), plum and quince trees are in good condition; cherry, poor; pear, fair condition.

Varieties in best condition: Cherry, Early Richmond, English Morello; peach, Amsden, Hale, Ward's Late Free, Crawford's, Smock, Stump the World, and seedlings; plum, Wild Goose, Miner.

Varieties recently introduced that are promising: Apple, Babbit, Mammoth Black Twig; peach, Champion, Elberta; pear, Idaho, Garber, Wilder; plum, Botan; quince, Missouri Mammoth.

VINEYARDS.—Are not uniformly good in condition. Young vines are in the best of health, while old ones are weakened by diseases and prevalent insects. Black rot was especially prevalent in old vineyards.

Varieties most successfully grown: Concord, Catawba, Delaware, Niagara.

Newly tried sorts which are promising: Moore's Early, Elvira, Empire State, Cottage, Moore's Diamond, Colerain.

SMALL FRUITS.—The condition of all classes, fair to good.

Varieties most successfully grown: Blackberry, Snyder; currant, Red Dutch, Fay, White Grape; gooseberry, Downing, Houghton; raspberry, Gregg, Hopkins, Shaffer, Turner; strawberry, Bubach No. 5, Crescent, Jessie, Captain Jack.

CROPS.—Apple and plum trees bore a light crop; pear, good; peach, medium; cherry, a failure. In quality, apples, medium; pears, good; peaches, poor. About one-half of the apples, three-fourths of the peaches and all of the pears were a first-class product.

Small fruits: All classes bore a fair crop excepting the strawberry, which was light. In quality, all were good excepting strawberries, which were poor. All were a marketable product excepting the strawberry, one-half of which would not grade up.

INSECTS were not as prevalent as in preceding years. Spraying with insecticides and fungicides has been successful.

(South half.—By Mrs. S. Hatch, Wathena.)

ORCHARDS.—All classes of fruit trees are in good condition. The Missouri Pippin, Winesap and Rawle's Genet apple, Early Richmond, Osheim and Governor Wood cherry, Stump the World, Crawford's, Elberta and Summer Snow peach, Kieffer, Seckel, Angouleme and Bartlett pear, Wild Goose plum and Orange quince are apparently in best health.

The Ben Davis apple and Early Richmond cherry begin to fail at 20 years of age; Kieffer pear at 12 years; this from attacks of blight.

VINEYARDS.—Plantations of a bearing age appear to be healthy, and made a good growth.

Varieties successfully grown are the Concord, Moore's Early, Worden, Cottage, Ives, Janesville.

SMALL FRUIT.—All classes are in good condition, excepting currant and gooseberry, which made a poor growth, and the Early Harvest blackberry, the canes of which were killed by the last winter.

Varieties most successful are: Blackberry, Snyder, Kittatinny, Ancient Briton; currant, Red Dutch, Fay; gooseberry, Houghton; raspberry, Doolittle, Gregg, Souhegan, Hopkins, Turner, Shaffer; strawberry, Crescent, Bubach, Michel, Charles Downing.

Of these, the Snyder blackberry, Fay and Red Dutch currant, Houghton goose-

berry, Doolittle, Souhegan, Gregg and Shaffer raspberry and Crescent strawberry form the best list for market purposes.

**CROPS.**—All classes of orchard fruits were a failure, excepting the peach, which was heavy and of good quality.

**Small fruits:** The crop of blackberries was heavy, and of good quality; but of all others, light. The quality, however, was fair to good.

Grapes were a fair crop, and of medium quality.

**INSECTS.**—These enemies of fruit growing were not as prevalent in 1898 as in preceding years.

Insecticides were not used, but fungicides were, and successfully, on grapes and peaches.

JACKSON COUNTY.—BY J. W. WILLIAMS, HOLTON.

**ORCHARDS.**—Present condition: Young plantations are in fine condition; old ones are failing. Varieties in the best condition: Apple, American Summer, Talman, Ben Davis, Rawle's Genet, Yellow Bellflower, Sweet Russet, Dominie, Lowell; cherry, Early Richmond, Morello; peach, seedlings; pear, Angouleme, Seckel; plum, Damson, Wild Goose; quince, Orange.

**Decline of fruit trees:** The following sorts begin to decline at from 15 to 20 years: Apple, Red Astrachan, Early Harvest, Ortley, Winesap, Grimes's Golden; cherry, all the heart varieties, at 12 to 15 years; peach, at 15; pear, Bartlett at 15; plum, Wild Goose at 12, Damson, 15 to 20 years. Blight kills the quince at an early age.

The main cause for the decline is a too vigorous growth, resulting from a very rich soil.

Varieties tried and rejected: Apple, Red Astrachan, Ortley, Yellow Bellflower; cherry, all the heart family; peach, nearly all the class known as "budded;" pear, Bartlett.

**VINEYARDS.**—All plantations of bearing age are in fine condition, having a healthy cane growth. Black rot has not been prevalent. The Moore's Early, Concord and Worden are most successfully grown.

**SMALL FRUITS.**—In the spring of 1898 the condition of blackberry and straw berry plants was poor; currant, gooseberry, and raspberry, good.

Varieties most successfully grown: Blackberry, Snyder, Kittatinny; currant, Red and White Dutch; gooseberry, Houghton; raspberry, Souhegan, Palmer, Kansas; strawberry, Captain Jack, Crescent, Jessie, Bubach No. 5, Windsor Chief.

The best marketing sorts are the Snyder blackberry, Red Dutch currant, Houghton and Downing gooseberry, Souhegan, Gregg and Palmer raspberry, Jessie, Captain Jack, Crescent, Windsor Chief and Gandy strawberry.

**CROPS IN 1898.**—All classes of orchard fruit were light, excepting of peach, which was medium, and in quality fairly good, while of others the quality was poor. None of the crops were first class in grade, excepting the peach, and of these about three fourths were good market quality.

**Small fruits:** The crop was light of all classes excepting grapes and raspberries, which were medium in quantity and quality. In quality all were good.

**INSECTS.**—The Codlin Moth, Apple Curculio and Plum Curculio were prevalent. Spraying with insecticides was successful in checking their ravages to some extent.

JEFFERSON COUNTY.—BY JOSHUA WHEELER, NORTONVILLE.

(North half.)

**ORCHARDS.**—Condition of apple, cherry, pear, and young peach trees, good.

Varieties in best condition: Apple, Maiden's Blush, Ben Davis, Jonathan, Winesap; cherry, Early Richmond, Montmorency; peach, Alexander, George the Fourth, Cooledge, Barnard's Early, Old Mixon Free; pear, Bartlett, Seckel, Kieffer.

Varieties tried, and failed to give satisfaction: Apple, Rawle's Genet, Missouri Pippin; peach, Crawford's Early and Late, Waterloo; plum, all kinds.

VINEYARDS.—Plantations of a bearing age are in good condition. Moore's Early, Concord, Pocklington, Wyoming Red and Champion are the most successful varieties. Black rot was not prevalent on the fruit in 1898.

SMALL FRUITS.—Condition: Blackberry, raspberry, and strawberry, poor; currant, good.

The Snyder blackberry, Red Dutch currant, Tyler, Ohio and Turner raspberry, Crescent and James Vick strawberry, are the most successful and profitable sorts for market purposes.

CROPS.—Orchards of all classes light and poor in quality, excepting the cherry, which was fairly good.

About 10 per cent. of the apple crop, 75 per cent. of cherry, and 10 per cent. of peach and pear, was first class, marketable fruit.

Small fruits: Blackberry and strawberry, light crop; currant, heavy; raspberry, medium. In quality, currants and raspberries, good; blackberries, poor.

Grapes bore a medium crop, good in quality, 100 per cent. of which was marketable.

Twenty per cent. of the blackberry crop, 100 per cent. of the currant and raspberry, and 56 per cent. of the strawberry, was first-class product.

INSECTS were prevalent, and infested nearly all of the apples. Spraying with insecticides and fungicides has not been practiced.

*(South half.—By H. R. Roberts, Perry.)*

ORCHARDS.—The condition of apple trees is better than for many years past, and all other classes are in good condition.

I do not know of any apple trees which are declining from age; some are failing through neglect, insect attacks, or bad treatment by the proprietors.

Cherry trees as a rule are short lived, and, to be successful, new plantations should be made every few years.

Pear blight has caused the death of pear trees. The Kieffer is doing the best of any sorts tried. Black knot has been discovered on some plum trees.

VINEYARDS.—The condition of bearing plants is excellent, and the crop prospects for 1894 are good. Black rot has not yet appeared upon our grapes.

CROPS IN 1898.—Of apples, very light, and their quality poor; peaches, good crop on uplands, and their quality was good; what few pears were grown were of good quality.

SMALL FRUITS yielded a light crop; grapes, heavy, and of good quality.

INSECTS.—Crops of fruit were so light that no comparison with preceding years can be determined as to prevalence in 1898, and the unfavorable conditions of weather prevailing during the past two years at spraying time does not permit of an opinion based on facts as to the benefits of such treatment.

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JEWELL COUNTY.—By E. H. KERN, MANKATO.

ORCHARDS.—The present condition of all classes of orchards, poor, excepting the plum, which is good.

Varieties in best condition: Apples, Ben Davis, Winesap, Rome Beauty, Rawle's Genet, Maiden's Blush; cherry, Early Richmond, Morellos; peach, seedlings; pear, Bartlett; plum, Mariana, Wild Goose, Shipper's Pride.

Age of decline of fruit trees: Apple, Willow Twig, Bellflower, Dominie, Fameuse, Siberian Crab, at about 14 years; pear, a few Idahos and some Seckels, at five years. All others do not show evidences of decline.

New varieties that are promising: Apple, York Imperial, Gano; cherry, Dye-house, Montmorency; plum, Shipper's Pride.

Varieties tried and rejected: Apples, nearly all sweet varieties, and all of the sweet class of cherries.

VINEYARDS.—The present condition of plantations is poor, owing to the injury of the last dry winter. Black rot has not damaged the fruit.

Varieties most successfully grown: Concord, Niagara, Moore's Early, Moore's Diamond, Elvira, Pocklington.

SMALL FRUITS IN 1893.—The present condition of plants of all classes, poor, excepting the gooseberry, which is fair.

Varieties most successfully grown: Blackberry, Snyder, Early Cluster; currant, Red Dutch, White Grape; gooseberry, Houghton, Smith's [Improved], and Industry; raspberry, Kern's, Souhegan, native sorts. Of these, the Snyder blackberry, White Grape currant, Industry gooseberry, Souhegan raspberry, are the best for market purposes.

CROPS IN 1893.—Orchards of all classes of fruit bore a light crop, and in quality poor; a small portion was first class.

Small fruits: The crop was light of all classes and poor in quality, excepting the grape, which was fairly good.

INSECTS.—The Codlin Moth, Apple Curculio, Plum Curculio, were more numerous than in years before. Spraying with insecticides has been quite beneficial and is being generally adopted for the destruction of insects, and, with fungicides, beneficially, in checking raspberry rust.

GEARY COUNTY.—By WM. CUTTER, JUNCTION CITY.

ORCHARDS.—Bearing trees of all kinds made a small but healthy growth this year. Wood ripened early, with plenty of fruit buds well matured, and prospects are favorable for a crop next year.

SMALL FRUITS of all kinds went into winter quarters in poor condition and cannot give us a full crop another year. Strawberries particularly are in very bad condition. Grapes are in good condition, could not be more promising. Nursery stock made a good growth and ripened up well.

GOVE COUNTY.—By E. BOWLES, GOVE CITY.

ORCHARDS.—Condition: Apple trees are in poor condition; cherry, fair; peach and plum, good.

The Ben Davis and Winesap apple, Early Richmond cherry, seedlings of the peach, Miner and Wild Goose plum trees, seem to thrive and succeed the best.

VINEYARDS.—Vines of a bearing age are in a fair condition, where proper care has been given them. The wood growth in 1892 was good, but the drought weakened the plants.

CROPS IN 1893.—Apple, peach and pear trees bore no fruit; cherry and plum yielded a light crop.

GRAHAM COUNTY.—By LEVI PRITCHARD, HILL CITY.

Fruit growing in this county is in its infancy, and is yet on trial for a future determination. That a certain degree of success will be attained, is evident from the present condition of apple, cherry and peach trees, which is good, but which entirely failed in yielding a crop in 1893.

SMALL FRUITS yielded a light crop, but poor in quality.

Adversity in these lines has been in common with many other counties this year in other parts of our state.

## LEAVENWORTH COUNTY.—By E. J. HOLMAN, LEAVENWORTH.

**ORCHARDS.**—Condition: Apple, cherry, and peach, young trees, pear and native plum, and the hardy Japan varieties, good.

Varieties in best condition: Apple, all the old Russian sorts, and most of the others generally in use; cherry, English Morello, Early Richmond, Napoleon Bigarreau; peach, Alexander, Rivers, Troth's Early, Elberta, Stump the World, Old Mixon Free, Old Mixon Cling, Smook, Heath Cling, Lemon Cling, Salway; pear, White Doyenne, Louise Bonne de Jersey, Bartlett, Anjou, Angouleme, Seckel, Clairgeau, Sheldon, Vicar, Buffum, Howell, Onandaga (syn. Swan's Orange); plum, Wild Goose, Weaver, Miner, De Soto; quince, Orange, Rea's (mammoth).

Age at which varieties begin to decline: Apple, Ben Davis, Early Pennock, High-top Sweet, Baldwin, Lowell, White Winter Pearmain, Rawle's Genet, Milam, Early Joe, Keswick, Winesap, King of Tompkins County, Sops of Wine, Mother, Rome Beauty, at 20 years of age; cherry, all varieties, at 15 years.

Evident cause of decline: Apple trees, cold winters, hot summers, and exhaustion from overbearing; cherry, extremes of temperature; peach, damaged by severe winter weather; pear, uncongenial climate and soil, and blight; plum, tenderness of varieties planted; quince, unfavorable conditions of soil.

New varieties introduced that are promising: Apple, Red Beitigheimer, Arkansas Black; plum, Botan. Abundance, Kelsey.

Varieties tried and rejected: Apple, White Winter Pearmain, Winesap, Ortley, Rhode Island Greening, King of Tompkins County, Roxbury Russet, Black Gilliflower, Striped Gilliflower, Large Yellow Bough, Hawley, Yellow Bellflower, Newtown Pippin, Fall Winesap, Lawver, Gloria Mundi; cherry, the Bigarreau class; peach, Hale.

**VINEYARDS.**—The condition of fruiting plantations was very fair in 1893. Black-rot fungus was not prevalent in 1892. The Concord, Ives and Early Victor are the most successfully grown. Niagara is one of the newly-tried sorts that is promising.

**SMALL FRUITS IN 1893.**—Condition: Blackberry, raspberry, strawberry, fair; currant and gooseberry, good.

Varieties most successfully grown: Blackberry, Snyder and Taylor, but the Snyder is the most generally planted sort; currant, Red Dutch, White Grape, Fay; gooseberry, Houghton, Downing; raspberry, Souhegan, Palmer, Cuthbert; strawberry, Warfield No. 2, Crescent, Bubach No. 5, Charles Downing, Captain Jack, Jessie.

Varieties most profitable for market: Blackberry, Snyder; currant, Red Dutch, Fay; gooseberry, Houghton; raspberry, Palmer, Cuthbert; strawberry, Warfield, Bubach, Crescent, Charles Downing, Captain Jack.

**CROPS IN 1893.**—Orchards: The yield from all classes was light, excepting of peaches, which was medium. In quality, peaches, plums, quinces, good; apples, cherries, poor; pears, fair.

Small-fruit crops: The yield of all classes was medium, and the quality good. Grapes yielded a heavy crop, of good quality, 75 cent. of which was first-class fruit. Of blackberries, currants, gooseberries, raspberries, 100 per cent., and of strawberries 80 per cent., of the crop was marketable.

Insects were not as prevalent in 1893 as in preceding years.

Insecticides have been used with varying results. It will require more experimentation to determine their value with many.

## LINCOLN COUNTY.—By J. WEIDMAN, PLEASANT VALLEY.

**ORCHARDS.**—Condition: All classes of fruit trees are in good condition.

Varieties in best condition: Apple, Ben Davis, Rawle's Genet, Missouri Pippin, Winesap, Oldenburg, Fameuse, Rambo, Smith's Cider, Gano, Gilpin, Jonathan, Autumn

**Strawberry** (syn. Late Strawberry); cherry, Early Richmond, English Morello, Montmorency; peach, all kinds of young trees; pears and plums, all kinds are healthy.

Varieties fully tried, and rejected: Apple, Lawver, Golden Russet, Early Harvest, Red Astrachan, Yellow Bellflower.

**VINEYARDS.**—Plantations of vines of a bearing age are in good condition. The black-rot fungus did not damage the fruit in 1892 or 1893.

Concord, Ives, Elvira, Dracut Amber, Missouri Reisling, Catawba, Goethe, Worden, Cynthiana and Pocklington are most successfully grown.

Of the newly-tried sorts, the Niagara and Early Victor are the most promising.

**SMALL FRUITS.**—Condition: Blackberry, gooseberry, good; raspberry and strawberry, poor.

Varieties most successfully grown: Blackberry, Kittatinny, Snyder; gooseberry, Houghton, Downing; strawberry, Crescent, Charles Downing, James Vick.

**NOTE.**—The James Vick is the most valuable berry for this locality. It stands at the front every season.—*Weldman.*

**CROPS IN 1893.**—All classes of fruit bore a light crop. The plum and quince failed entirely. The quality of all such as fruited was good. About 75 per cent. of the apples and all of the cherries were first-class product.

Small fruits: The crop was medium of blackberries and strawberries, and light of gooseberries and raspberries. The quality of all was good. Grapes were a medium crop and good in quality.

**INSECTS IN 1893.**—The apple worm was not as numerous as in preceding years. The Plum Curculio was not seen, as there was no fruit for it to work on. Apple Curculios are not known to me.

Spraying with insecticides: I have used London purple during the last six years on the apple orchard, at the rate of 1 pound to 100 gallons of water, and as a result the orchard is nearly clean of all kinds of insects.

Fungicides have not been used, for the reason that there has been no necessity for them.

#### MARSHALL COUNTY.—By R. H. HAWKINS, MARYSVILLE.

(North half.)

**ORCHARDS.**—Condition: Fruit trees have suffered much injury during the last two years and are still in a low state of vitality. Some of all ages have died the present season.

Of the common varieties of apples, the Missouri Pippin and Jonathan trees are in the best condition, and of the plums the Wild Goose, Miner. and Mariana.

Trees of the Ben Davis and Winesap apples begin to decline in vitality at 17 to 18 years of age, owing mainly to long and severe droughts.

Of the newly introduced varieties, the Yellow Transparent bears very young, but is subject to blight.

Of apples, the White Winter Pearmain has been rejected as not a satisfactory variety; of plums, the Blackman.

**VINEYARDS.**—Some plantations came through the winter badly damaged; others without injury. The latter are now in good condition.

The black-rot fungus has not been prevalent in this locality.

Varieties most successful: Concord, Elvira, Noah, Perkins, Cottage.

Of the newly-tried sorts, the Moore's Early and Brighton are promising. The latter need protection during winter.

**SMALL FRUITS.**—All classes were in poor condition in the spring of 1893, owing to a feeble growth the year before, caused by drought.

**CROPS IN 1893.**—Orchards: Apple, cherry and peach trees bore lightly and the quality was poor, excepting the cherry, which was good.

**Small fruits:** Crops of all classes very light, but in quality good, excepting the raspberry, which was poor.

**Grapes:** Uninjured vines bore a fair crop, of good quality.

**INSECTS.**—A much larger proportion of the apples were wormy than in former years.

(*South half.*—By J. M. Winter, Irving.)

**ORCHARDS.**—Condition: Apple, cherry and young peach trees are in good condition; all others, poor.

**VINEYARDS.**—Bearing vines are in poor condition, owing to severe cold weather during the winter of 1892-'93. The Concord has been most largely planted, and leads in successful results.

**SMALL-FRUIT** plantations of all classes are in poor condition.

**CROPS.**—Apple and cherry orchards bore some fruit, but all others failed entirely in fruitfulness.

The quality of apples, from sprayed trees only, was fairly good.

**Small fruits:** All classes bore a light crop of fairly-good fruit.

**Grapes** bore a light crop, of fair quality.

**NOTE.**—The failures of past years have caused discouragement, and many are turning their attention to other lines.

NEMAH COUNTY.—By S. J. BALDWIN, SENECA.

(*North half.*)

**ORCHARDS.**—The present condition of apple, cherry and plum trees is good; peach and pear, poor.

Varieties in best condition: Apple, Ben Davis, Rawle's Genet, Jonathan, Yellow Transparent, Oldenburg, Talman, Lawver; cherry, Early Richmond, English Morello, Montmorency, Duke of Dayton; \* peach, Alexander; pear, Kieffer; plum, Botan, Wild Goose, Duane Purple, Mariana, Peach; quince, Champion.

Age at which decline begins: Apple, Missouri Pippin, Rhode Island Greening, 10 years (others are not failing); cherry, Empress Eugenie, 10 years; peach, all kinds at 4 to 8 years; pear, Bartlett (dwarf) and Le Conte (standard), at 8 years; plum, Lombard and Damson, at 8 years; quince, Orange, at 8 years.

Evident cause of decline: Apple, overproduction; cherry, decay of the inner wood; peach, severe winters; pear and quince, blight; plum, dry rot.

Promising varieties recently introduced: Apple, Yellow Transparent; cherry, Ostheim, Wragg; peach, Champion; pear, Kieffer; plum, Botan; quince, Meech's Prolific.

The Wealthy and Walbridge apple, Utah Hybrid cherry, Le Conte pear, Forest Rose and Mariana plum, have been fully tried, and rejected as unsatisfactory varieties.

**VINEYARDS:** Bearing vines were severely injured by an early spring freezing, but some survived and bore a fair crop of fruit. Black rot has not been prevalent.

Varieties most successful: Concord, Lady, Worden, Ives, Hartford, Pookington, Moore's Early. The Worden is a promising, newly-introduced variety.

**SMALL FRUITS.**—Blackberry canes and strawberry plants were severely injured by the winter of 1892-'93. The condition of the currant, gooseberry and raspberry was only fair.

Varieties most successfully grown: Blackberry, Snyder; currant, Fay, Orandall;

\* Doubtful nomenclature.—SECRETARY.

Gooseberry, Houghton; raspberry, Gregg, Golden Queen, New Kansas; strawberry, Captain Jack.

**CROPS.**—Orchard: Apple, peach, plum, very light; cherry, medium; all others, a failure. In quality, only the cherry and peach were good. Only the cherry was first-class product.

Small fruits: The raspberry bore a good crop, which was also good in quality.

Grape vines bore a medium crop of first-class fruit.

**INSECTS** were more prevalent than in previous years. Spraying with insecticides was not practiced the present year, owing to the scarcity of fruit; but in previous years the result was good.

(South half.—By A. C. Durland, Centralia.)

**ORCHARDS.**—All classes of fruit trees are in a good to excellent condition; while the growth of some is not strong, yet such is well ripened and give encouragement for fine crops in 1894, excepting old peach trees, which the extreme cold in the winter of 1892 and 1893 and the severe drought of the present year's summer have seriously damaged; young trees are in a fine condition. The quince has not yet succeeded in this locality.

Varieties in best condition: Apple, Red Astrachan, Early Harvest, Yellow Transparent, Oldenburg, Maiden's Blush, Jonathan, Ben Davis, Smith's Cider, Arkansas Black, Rawle's Genet, Missouri Pippin; cherry, Early Richmond, Common Morello; peach, Elberta, Hale, Large Early York, Wager, Late and Early Crawford; pear, Bartlett, Seckel, Angouleme—blight has not been as prevalent as in years past; plum, Wild Goose, De Soto; quince, Orange. Very few quince trees have been planted and none have been satisfactorily fruitful.

Varieties and the age at which the trees begin to decline: Apple, Winesap, all varieties of Russets. Grimes's Golden, about 50 to 60 per cent. of those set prior to 1875 have died; cherry, Early Richmond at 10 to 12 years old; sweet varieties do not succeed; peach, most sorts at 6 to 10 years of age; the Late Crawford seems to be the hardiest of all; pear, Flemish Beauty and Seckel, six to eight years.

Evident cause of decline: Apple, blight, borers, and neglect; cherry, from allowing the sprouts to grow and the land swarded with blue grass; peach, borers; pear, blight, neglect, and dry summers; plum, neglect; quince, out of its proper latitude.

New varieties introduced and promising of success: Apple, Yellow Transparent, Arkansas Black, Gano, Colton; peach, Elberta; pear, Idaho; plum, De Soto.

Varieties fully tried, and rejected: Apple, Rambo, Rawle's Genet, Winesap; cherry, all sweet varieties; pear, Flemish Beauty.

**VINEYARDS.**—The condition of those of a bearing age is most excellent, the canes having ripened to outmost extremity.

Varieties most successful: The Concord leads; Worden, Moore's Early, Pocklington and Elvira rank next. The Early Victor and Jessica are promising varieties.

**SMALL FRUITS IN 1893.**—Condition in the spring: Blackberry, raspberry, and strawberry, poor; currant and gooseberry, fair.

The Taylor and Snyder blackberry, Red Dutch, Fay and Crandall currant, Downing gooseberry, Cuthbert and McCormick raspberry, Crescent and Wilson's Albany strawberry, are most successfully grown.

**CROPS IN 1893.**—Orchards: Of apples and peaches, very light; cherries, fair; all others, a failure. In quality: Apples, poor; cherries, peaches, fair.

Small fruits: Of grapes and currants, fair, and quality fair to very good; all others, light, and quality poor.

Of the grapes, 90 per cent.; currants, 50 per cent.; gooseberries, 25 per cent.; raspberries, 10 per cent.; strawberries, 5 per cent., were marketable.



INSECTS were not prevalent; therefore, spraying with insecticides was not practiced. Fungicides were used on grapes for black rot, and proved beneficial.

NORTON COUNTY.—By Jno. J. O'TOOLE, DEWIZES.

(North half.)

ORCHARDS.—The condition of all classes of fruit trees is fair to good.

The following varieties are in best condition: Apple, Ben Davis, Winesap, Missouri Pippin, Maiden's Blush, Early Harvest; cherry, Early Richmond, English Morello, Montmorency; plum, Miner, Wild Goose.

Twig blight was prevalent to a considerable extent, but not very damaging. Some rust was present on raspberry, and mildew on leaves of grapevines, but no other hindrance occurred during the season to a healthy growth; and vineyards, on November 1, were in good condition. The most successful one is located on second-bottom land, having a dark, sandy loam, clay subsoil, and limestone base.

SMALL FRUITS.—Suffered from heat and drought; consequently the berries were of a poor quality. This class of fruit has not been extensively grown in this locality.

(South half.—By J. J. Alexander, Norton.)

ORCHARDS.—Conditions: All classes of fruit trees are in fair to good condition, excepting the pear, which has suffered severely from blight, the Bartlett and Kieffer escaping.

Varieties in best condition: Apple, all leading varieties seem to be in about the same condition; cherry, Early Richmond, English Morello; peach, Kansas seedlings; plum, Wild Goose, some of the gage varieties, and our native sorts.

Of apples, the Stark, McIntosh, Bellflower and some others have been condemned, owing to their liability to attacks of blight.

VINEYARDS.—Grapevines, when treated properly, are successfully grown. The present condition is good; canes are well matured.

The Concord is most generally planted.

SMALL FRUITS.—Plantations of the gooseberry, raspberry and strawberry are in good condition, blackberry almost a failure, and the currant is not a general success.

Varieties most successfully grown: Blackberry, Snyder; currant, Cherry and Grape; gooseberry, Houghton and Downing; raspberry, Souhegan and Gregg; strawberry, all varieties do well.

CROPS IN 1893.—Orchards: Apples were very light; cherries, good; pears, poor. The quality of all, except cherries, poor.

INSECTS were about as numerous in 1893 as in preceding seasons.

Spraying with insecticides has not been practiced, nor with fungicides.

OTTAWA COUNTY.—By J. W. McLAREN, SUMNERVILLE.

ORCHARDS.—Old orchards have made a light growth, and most of the trees planted this year have failed. Of apples, the Ben Davis, Rawle's Genet, Maiden's Blush, Jonathan, Willow Twig and Early Harvest are in best condition. Seedling peach and native wild plum trees endure the climate best.

Of varieties of apples, the Winesap, Missouri Pippin, Cooper's Early, Red Astrachan, Lowell (Missouri Superior), McAfee and Siberian crabs begin to decline at 18 years old, evidently caused by hot, droughty weather. Cherry trees also suffer from same cause.

Of the varieties of apples tried, High Top Sweet, Lowell and McAfee have been rejected as failures.

**VINEYARDS.**—Those of a bearing age were not in a vigorous condition in 1892. The wood ripened well, but the drought of 1893 seriously weakened the vines.

**SMALL FRUITS IN 1893.**—Currant, gooseberry and strawberry plantations were in good condition. The Red Dutch currant, the Houghton gooseberry, Crescent, Captain Jack and Wilson's Albany strawberry, are the most successful varieties. Of strawberries, the Crescent is the most profitable sort.

**CROPS IN 1893.**—Of apples and cherries, very light; peaches, an average crop. The quality of all was poor, excepting the peach, which was good. Of the small fruits, light, and quality poor.

**INSECTS.**—The Codlin Moth was prevalent; although spraying with insecticides was practiced this year, it did not prove an effectual check.

**PHILLIPS COUNTY.**—By J. W. KNODLE, WOODRUFF.

**ORCHARDS.**—Condition: Apple trees always grow slowly in this portion of the state, but maintain a good condition; cherry and plum, good; quince does not succeed, and peach trees require sheltered locations. Most of the known hardy sorts of apple, including crab apples, succeed; and those worked on hardy crab apple, whole roots, I believe, are best for this region. Also, the Morello varieties of cherry, propagated on the roots of Russian seedlings. The common American varieties of plum only succeed. All classes of fruit trees require a low head, and to be grown in bushy form, and well protected with shelter belts.

Fruit growing could be made a profitable pursuit, if planters would give it proper attention, in selection of location and varieties, thoroughly preparing the ground, even resorting to deep, subsoil stirring, and enriching with manure. I have been successful on a small scale by using such methods. The encouragement increases year by year, and in time success will be fully attained.

Insects common to other portions of the state are prevalent. Spraying with Paris green has been successfully practiced.

**POTTAWATOMIE COUNTY.**—By N. H. PIXLEY, WAMEGO.

**ORCHARDS.**—Condition: All classes of fruit trees are in fair to good condition. They bloomed profusely in the spring, excepting the pear. The crop of apples, cherries and plums was cut short by cold, wet weather. The peach crop was severely injured by the curculio.

Varieties in best condition: Apple, Rawle's Genet, Missouri Pippin, Grimes's Golden, Wine,\* Cooper's Early, Early Margaret, Maiden's Blush, Ben Davis, Wine-sap; cherry, Early Richmond; peach, Hale, Crawford's Early and Late, Kansas seedlings; pear, Kieffer.

**VINEYARDS.**—Some of the vines are in fine condition; others are dying from overbearing and the rust disease.†

Some black rot developed in places. Bordeaux mixture was used successfully for this and the rust disease.

Varieties most successfully grown: Concord, Elvira, Clinton, Champion, Worden, Woodruff Red.

**SMALL FRUITS.**—Condition: Blackberry, good; currant and gooseberry, fair; raspberry and strawberry, poor.

Varieties most successfully grown: Blackberry, Kittatinny, Early Harvest; currant, Red and White Dutch, Fay; gooseberry, Smith, Houghton; raspberry, Gregg, Marlboro; strawberry, Crescent, Charles Downing, Captain Jack.

\* Synonym: Pennsylvania Redstreak.

† Probably anthracnose.

**CROPS IN 1898.**—Orchards: Apples, one-fifth of a crop; peaches, one-half; pears and quinces, one-fifth; cherries, almost a total failure.

In quality, all were poor.

Small fruits: Blackberries were a full crop; all others, light. Grapes, light. In quality, all were poor, excepting grapes and blackberries, which were fair to good.

**INSECTS.**—The apple worm and curculios were as prevalent as in preceding years, and the Tree Cricket did much injury.

Spraying with insecticides: So few of our orchardists use this treatment that very little effect is made in the suppression of the apple worm.

Fungicides, when used in vineyards, have proven effective against fungus attacks. The vines seem to be cleaned of these enemies.

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**RAWLINS COUNTY.**—By W. A. MIKESSELL, ATWOOD.

**ORCHARDS.**—Condition: All classes of fruit trees are in good condition, excepting the peach, which is only medium. They have not yet borne sufficiently, being young, to determine, relatively, the value of varieties.

Vineyards are in good condition; only a few are of fruiting age, but all are growing well.

**SMALL FRUITS.**—Plantations of these are in good condition, excepting strawberries, which are poor.

**CROPS IN 1898.**—Orchards: All classes yielded a light crop, excepting cherries and plums, which bore a fairly good crop. The quality of all was fair to good.

Small fruits bore a light crop of all classes, excepting currants, which was heavy. In quality, the product was good.

**INSECTS** were as numerous as in preceding years. No attempt to control them by spraying with insecticides has been made.

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**REPUBLIC COUNTY.**—By O. A. A. GARDNER, BYRON, NEB.

**ORCHARDS.**—The condition of all classes of orchard trees is good, excepting the pear, many of which have been damaged by blight. There is no material difference in condition of classes or varieties.

**VINEYARDS** all seem to be in good health. The cane growth is rather short, owing to a continued drought. Grape rot has not been noticed in any of our vineyards the past season.

The Concord still leads as the most successful variety grown.

**SMALL FRUITS.**—Plantations of all classes were in rather weak condition, owing to drought.

The Kittatinny blackberry, Red Dutch currant, Houghton gooseberry, Turner, Shaffer, McCormick and Gregg raspberry are the most successful.

**CROPS.**—All classes of orchard fruit were light, and poor in quality, excepting peaches, which were fairly good. The same was true of small fruits as a crop. Grapes were good in quality.

**INSECTS** were as prevalent as in preceding years. Spraying to suppress them was not generally practiced, but will be another season, probably.

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**RILEY COUNTY.**—By A. SOUTHWICK, RILEY.

(North half.)

**ORCHARDS.**—Condition: All classes generally are healthy when given reasonable care in culture. Pear trees should be carefully guarded, to prevent weeds and grass occupying the ground on which they are planted. Native plum trees are most satisfactory in results.

Varieties in best condition: Apple, Ben Davis, Autumn Strawberry, Fameuse, Colvert, Missouri Pippin, Maiden's Blush, Whitney No. 20 (crab); cherry, Morellos, Early Richmond, all of the class known as sour cherries; peach, seedlings; pear, Bartlett, Angouleme, Kieffer; plum, seedlings.

The age that trees decline: Apple, Rambo, Gilpin, Winesap, all very early sorts, show signs of decline at from 20 to 30 years; cherry, sweet varieties at four to five, and sour kinds at 15 to 20 years; peach trees cannot be relied on for more than 8 to 12 years, and budded sorts begin to fail sooner; plum, begin to fail at 10 to 15 years.

Causes of decline: Apple, cherry and peach trees, from neglect in cultivation, blight and non-adaptation to the climate; pear, unsuitable climate and soil, and attacks of blight; plum, neglect, black-knot, and borers.

Varieties fully tried, and rejected: Apple, Willow Twig, its fruit being subject to rot on the tree; Colvert, a shy bearer; cherry, all of the sweet class; peach, nearly all of the budded sorts; plum, all but the seedling class, owing to their liability to attacks of the Plum Curculio.

VINEYARDS.—Condition: All plantations of bearing age, under proper care, are in good health. The cane growth in 1892 was rather short, but well matured; that for 1893 was more vigorous. Black rot was not prevalent.

The Concord is planted most extensively and is reliable.

SMALL FRUITS.—Condition: Blackberry, raspberry, strawberry, rather poor; gooseberry, good. Currants are so little planted that very little is known of them. Some of the Red Dutch have been grown.

Varieties most successful: Gooseberry, Houghton; raspberry, McCormick (syn. Mammoth Cluster), Thornless, Gregg; strawberry, Wilson, Charles Downing, Crescent. Blackberry canes are so liable to be killed by winter that very little planting has been done.

CROPS IN 1893.—Orchards: Of all classes, light, and in quality poor, excepting of the peach, which was fairly good. A small proportion of the crop was first class; that of the peach, about 50 per cent.

Small fruits: Grapes were a medium crop, and of good quality. All others nearly a failure and inferior in quality.

INSECTS.—The Codlin Moth was not as numerous as in 1892; Plum Curculio and Apple Curculio about as prevalent. Spraying with insecticides has not generally been practiced, but the results of the treatment, so far as tried, have been partially successful.

*(South half.—By T. C. Wells, Manhattan.)*

ORCHARDS.—Condition: All classes of orchard trees are generally in good condition.

New varieties tried and are promising: Apple, York Imperial, Gano, Arkansas Black; peach, Elberta.

Varieties fully tried, and rejected: Apple, Wagener, Yellow Bellflower—not profitable; cherry, all the sweet kinds, such as the heart and Bigarreau class.

VINEYARDS.—All plantations of bearing age are in good condition. Black rot was damaging to the crop of fruit. No means was used to check it, excepting at the Agricultural College, where the vines were sprayed with Bordeaux mixture, with full success.

Varieties most successfully grown: Concord, Worden, Cottage, Ives, Dracut Amber, Delaware, Moore's Early. Of the recently introduced, the Wyoming Red, Woodruff Red and Pocklington are promising varieties.

SMALL FRUITS.—All classes of these fruits are in good condition.

Varieties most successful: Blackberries, chance seedlings of the Lawton and Kit-

tatinny, where sheltered from the wind and hot sun; currant, Red Dutch, White Grape; gooseberry, Houghton, Pale Red; raspberry, of the blackcap class, selected native seedlings, Ohio, McCormick, Souhegan, Gregg; of red varieties, the Cuthbert and Shaffer, though both are somewhat tender; strawberry, Gandy, Bubach No. 5, Crescent, Warfield.

**CROPS IN 1893.**—Orchards: Apple, peach, quince, medium; all others, very light. In quality, the apples, peaches and quinces were good.

Small fruits: Grape, currant, raspberry, medium; strawberry, heavy; blackberry and gooseberry, light. In quality, all classes were good.

**INSECTS.**—The Codlin Moth was as prevalent as in preceding years. Spraying with insecticides has given good results, though not an entire protection to the fruit.

#### SALINE COUNTY.—By A. W. JONES, SALINA.

##### (North half.)

**ORCHARDS.**—Condition: All classes of fruit trees are in good condition excepting the peach and pear, which are only fair, and the quince, which has been so far an entire failure.

Varieties in best condition: Apple, Early Harvest, Summer Queen, Carolina June, Maiden's Blush, Lowell, Cooper's Early, Wealthy, Jonathan, Missouri Pippin, Ben Davis, Walbridge, Rawle's Genet, Winesap, Romanite; cherry, Early Richmond, English Morello; peach, Kansas seedlings; pear, Osband's Summer, Seckel, Bosc, Howell, Clapp's Favorite, Angouleme; plum, Wild Goose, Gage.

New varieties that are promising: Apple, Gano, York Imperial.

Vineyards of a bearing age are in very good condition, and yielded a fair crop of fruit in 1893, which was not injured by the black-rot fungus.

Varieties most successfully grown: Concord, Telegraph, Hartford, Ives, Janesville, Worden, Catawba, Agawam, Salem, Martha, Lindley, Elvira.

**SMALL FRUITS IN 1893.**—The condition of plantations of all classes was good, excepting the currant and gooseberry, which was only fair.

**CROPS IN 1893.**—Orchards: Apples, cherries, and plums, light; peaches and pears, medium. In quality, apples and cherries were fair; all others, good. Of the apples, about one-half of the crop was first-class fruit, and about three-fourths the cherries and pears were a first-class product. Peaches were good for seedlings.

Small fruits: Crops of all classes were light. In quality, blackberries, currants, and raspberries, poor; gooseberries and strawberries, good.

Grapes bore a medium crop, of good quality, nearly all of which was first class.

**INSECTS.**—The Codlin Moth and Plum Curculio were not, I think, as prevalent as in preceding years. I have not discovered the Apple Curculio in this locality.

Spraying with insecticides only has been practiced to some extent, but with uncertain results.

##### (South half.—By M. Dean, Bavaria.)

**ORCHARDS.**—The present condition of all classes is good. Of apples, the Missouri Pippin, Willow Twig, Grimes's Golden, Cooper's Early, Jonathan, Maiden's Blush and Early Harvest are in the best condition; cherry, all the Morello family; peach, Dean's Orange, Hale, Ward's Late; pears, White Doyenne and Madeleine.

Winesap apple trees begin to lose vitality when about 20 years old; budded peach at 10 to 15, and seedlings at 18 to 20 years. The cause is owing to excessive crops of apples, and old age with the peach.

Rejected varieties: Cherry, Governor Wood, Elton, and Choisy; peaches, Crawford's Early and Late, Barnard, Sturtevant, Lemon, Smock, White Imperial, Large Early York, Stump the World, Jaques Rareripe; plum, Purple Gage; quince, Orange.

**VINEYARDS.**—The condition of vines was good in both the years 1892 and 1893. The cane growth in the former year was poor to fair. The Concord is still the most successful variety. Black rot of the fruit was not prevalent.

**CROPS IN 1893.**—Apples, light, but quality good; peaches, on high lands, fair, quality extra good; pears, light, of fair quality.

About two-thirds of the crop of apples was marketable, and seven-eighths of the peach.

Grapes, a medium crop and of good quality.

INSECTS were about as prevalent as in former years.

SHAWNEE COUNTY.—By A. L. ENTSMINGER, SILVER LAKE.

**ORCHARDS.**—Condition: Apple, very good; cherry, have not recovered from the damage of 1892, and many trees are dead; peach, good; they have made a vigorous growth and promise a good crop in 1894; pear, still suffering from the blight in 1892; plum, good; the trees are loaded with well matured fruit buds for another year; quince, escaped blight and are quite healthy.

Varieties in best condition: Apple, Ben Davis, Minkler, Rawle's Genet, Winesap, Wealthy, Walbridge, Oldenburg, Mann, May, Shockley; cherry, Early and Late Richmond, Montmorency, Wragg; peach, plum, no difference is discernable in varieties; pear, Kieffer, Garber, Seckel, Anjou, Buffam, Howell, White Doyenne.

New introductions which are promising: Apple, Yellow Transparent, Wealthy, Arkansas Beauty, Crawford, Gano, Arkansas Black, Langford, Rainbow, Sutton Beauty, York Imperial; peach, Mountain Rose, Elberta, Globe, Hynes's Surprise, Wonderful.

Varieties fully tried, and rejected: Apple, Grimes's Golden, Yellow Bellflower, Flora, Northern Spy, Early Harvest, Red Astrachan, Carolina June, Huntsman, American Golden Russet; cherry, English Morello, Louis Philippe, Eugenie; pear, Clapp's Favorite, Flemish Beauty, Frederick Clapp, Summer Doyenne; the Idaho is a total failure.

**VINEYARDS.**—Their present condition is very good. Black rot was prevalent only in neglected vineyards. Spraying with fungicides usually checks it.

Varieties most successful: Moore's Early, Worden, Concord, Pocklington, Early Victor, Wyoming Red, Champion, Perkins, Cottage, Hartford, Draout Amber, Black Defiance.

**SMALL FRUITS.**—Plantations of all classes were in poor condition, excepting the blackberry and the Smith gooseberry, which were fairly good.

The Snyder, Taylor and Stone's Hardy blackberry, Smith, Downing and Houghton gooseberry, Souhegan, Early Ohio, Hopkins, Nemaha raspberry, Crescent, Captain Jack, Windsor, Bubach No. 5, Pineapple, Warfield, Cloud strawberry, are the most desirable sorts.

**CROPS IN 1893.**—Orchards: All classes were light, and poor in quality, excepting the peach, which was medium, and good in quality; about one-half of the crop of cherries and two-thirds of peaches were first class fruit; all others were second class.

Small fruits: The grape and blackberry crop was medium, and good in quality; the gooseberry crop was light, but of good quality; all others were light and of poor quality.

About 90 per cent. of the grape crop, 50 per cent. of the blackberry, 75 per cent. of the gooseberry, was first-class fruit; all other crops were second class.

**INSECTS.**—The Codlin Moth, Apple Curculio and Plum Curculio were not as numerous as in preceding years.

**Spraying:** This treatment has had a deadly effect upon damaging species, when carefully and thoroughly applied, both in arresting insects and checking the development of fungi.

Fungicides should be applied before growth of the plants or trees has started, and kept up as long as there is no danger of poisoning the fruit. There is very little use for spraying after the disease has effected a lodgment on the plant.

THOMAS COUNTY.—By G. M. BAUM, COLBY.

ORCHARDS.—All classes of fruit trees are considerably damaged by an extreme and prolonged drought.

Of the apple, Ben Davis, Early Harvest and Winesap are in the best condition; cherry, Early and Late Richmond endure the climate best.

It is pretty well demonstrated that only a very few varieties of the apple will stand the dry falls and winters of this locality.

All varieties of the peach and pear so far tried fail. The native wild plum, only, succeeds.

VINEYARDS.—Their present condition is very fair. The cane growth in 1891-'92 matured in good condition. Scarcely any growth was made in 1893.

The Concord holds its title as the most reliable sort.

Black rot has not been discovered upon the fruit.

SMALL FRUITS IN 1893.—The condition of the blackberry and currant, poor; raspberry and strawberry, fair.

Varieties most successful: Blackberry, Snyder; currant, Red and White Dutch; raspberry, blackcaps.

CROPS IN 1893.—There were none, excepting a light crop of grapes.

WASHINGTON COUNTY.—By E. K. WOLVERTON, BARNES.

ORCHARDS.—Condition: All classes of fruit trees have suffered from the last two years' drought, excepting those well cultivated, which are in fair condition.

Of apples, the Missouri Pippin, Rawle's Genet, Winesap, Smith's Cider and Oldenburg are in the best condition.

VINEYARDS.—The Concord is in fair condition, where well cared for. The growth in 1892 was poor.

Black rot of the fruit has not been prevalent since 1890.

CROPS.—The apple and cherry crops were very light in 1893. Of the apples, about one-fourth were first, one-half second and one-fourth third class.

Grapes were a light crop.

WYANDOTTE COUNTY.—By G. F. ESPENLAUB, ROSEDALE.

ORCHARDS.—Condition: All classes of orchard trees were in fair to good condition.

Varieties in best condition of health: Apple, Ben Davis, Winesap, Willow Twig, York Imperial, Maiden's Blush, Jonathan; cherry, Early Richmond, English Morello; pear, Anjou, Kieffer, Seckel; plum, Wild Goose, Miner, Japan; quince, Missouri Mammoth, Orange.

Age of varieties at time of declining: Apple, Early Harvest, Grimes's Golden, Red Astrachan, Carolina June, Fallawater, at from 15 to 20 years; cherry, English Morello, 10 to 12 years.

Cause of decline: Apple, climatic influences; peach, severe winters; pear, blight; quince, blight and borers.

New varieties introduced and promising: Cherry, Wragg; peach, Elberta; plum, Japan varieties.

Varieties fully tried, and rejected: Apple, Rawle's Genet, Tetofsky, Fallawater, Rambo; cherry, all sweet varieties.

**VINEYARDS.**—The present condition of vineyards of bearing age, good. Black rot was not prevalent.

Varieties most successfully grown: Concord, Worden, Moore's Early, Telegraph, Goethe, Elvira, Niagara, Early Victor.

New varieties tried and are promising: Wyoming Red, Ulster.

**SMALL FRUITS IN 1893.**—All classes in good condition.

Varieties most successfully grown: Blackberry, Snyder, Taylor, Ancient Briton, Minnewaski; currant, Red Dutch, Cherry; gooseberry, Houghton; raspberry, Hopkins, Gregg, Cuthbert; Strawberry, Jessie, Bubach No. 5, Crescent, Warfield.

The best variety for market, all requirements considered: Early—blackberry, Snyder; raspberry, Hopkins; strawberry, Crescent, Jessie. For late, blackberry, Taylor; raspberry, Gregg; strawberry, Bubach No. 5, Warfield.

**CROPS IN 1893.**—Orchards: All classes very light, excepting budded peach, which was good, seedling kinds, heavy, and the quince, fair.

In quality, apples and quinces, fair; cherries and budded peaches, good; pears and plums, poor.

Of the apple crop, about two-thirds, of cherries, all the crop, of peaches, all borne on budded trees, were first class.

Small fruits: Of the grape, blackberry and currant, heavy; gooseberry and raspberry, good; strawberry, light.

In quality, all the crops were good, and a marketable product.

Insects were as prevalent as in preceding years.

Spraying with insecticides has been practiced, but attended with doubtful results.

## CENTRAL FRUIT DISTRICT.

### COFFEY COUNTY.—BY S. S. WEATHERBY, LE ROY.

**ORCHARDS.**—The condition of all classes is good, excepting where neglected.

**VINEYARDS.**—The Concord is most generally planted, and, where properly cultivated, made a good cane growth, which is in good condition.

**SMALL FRUITS.**—Plantations of blackberry, raspberry and strawberry are in good condition.

**CROPS.**—Orchards: Very light of all classes, and poor in quality.

Small fruits: All classes light, and poor in quality. Grape vines bore a medium crop, fair in quality.

**INSECTS.**—The Codlin Moth and Apple and Plum Curculio were not so prevalent as in 1892. Spraying with insecticides was more generally practiced than formerly, and with good results.

**NOTE.**—The apple crop was the most complete failure that has occurred in the last 15 years.

### DOUGLAS COUNTY.—BY JAMES KANE, LAWRENCE.

**ORCHARDS.**—The condition of young apple and peach trees is good, but old trees are failing. Plum trees, where properly taken care of, are in good health.

Varieties in best condition: Apple, Ben Davis, Rawle's Genet, Winesap, Grimes's Golden, Jonathan, Red Astrachan, Rambo, Maiden's Blush, Bonum; cherry, Early Richmond; peach, Stump the World, Smock, Old Mixon Free, Wilkins's Cling, Hale (the fruit of the last named is very liable to rot before ripened); plum, Miner; quince, Orange.



Age at which trees begin to decline: Apple, Willow Twig, Flora, Lowell, Chango, at 10 to 12 years; peach, Lemon Cling, Old Mixon Cling, Heath Cling, Crawford's Late, Louise, at 9 to 12 years. This is owing to attacks of blight of the apple, severe cold, and neglect in cultivation and proper trimming of the peach. Some fail, being planted on unsuitable soil.

Varieties fully tried, and rejected: Apple, McAfee, Flora. The Missouri Pippin fails on limestone or alkaline land. Peach, Amsden, Late Crawford, Hale, Kansas Beauty.

VINEYARDS.—Condition, 1898: Wood growth light, but well matured on all varieties excepting Ives, Dracut Amber, Catawba. Some of the Catawba and Dracut Amber vines are dead, caused by insects attacking the foliage, and severe weather of the last winter. Crop prospects for 1894 are good.

Black rot was prevalent in 1893, and was not checked by spraying with Bordeaux mixture and carbonate of copper, with each three times.

Varieties most successfully grown: Concord, Worden, Moore's Early, Ives, Dracut Amber, Agawam, and Catawba in favorable locations. The Worden is better in quality than either Moore's Early or Concord, but the vine is somewhat tender, skin of the berry thin, and cracks open easily.

SMALL FRUITS.—Condition: Blackberry, Snyder and Taylor, good; Early Harvest and Kittatinny, bad, owing to the prevalence of orange-colored rust among them; raspberry, poor, many plantations on low, flat land being injured by a late spring frost.

Varieties most successfully grown: Blackberry, Snyder, Taylor; gooseberry, Pale Red, Houghton, Downing; raspberry, Souhegan, Gregg, Cuthbert, Shaffer; Hopkins succeeded in some locations; strawberry, Crescent, Beder Wood, Warfield No. 2, Bubach. All the foregoing, with the Early Harvest blackberry added, are the best for market purposes.

CROPS IN 1893 were light of all classes of orchard fruit, and poor in quality, excepting plums, which were good.

Small fruits: Blackberries were a heavy crop; gooseberries, medium; raspberries, light. Blackberries and gooseberries were of good quality, while all others were poor.

Grapes were heavy, and good in quality. About 80 per cent. of the crop was first-class product.

INSECTS.—The Codlin Moth and Plum Curculio were as prevalent as in preceding years, and the Tree Cricket was numerous, and very damaging to the peach crop.

Spraying with insecticides: Paris green mixed with Bordeaux mixture, a fungicide, was applied once before the buds on the trees opened, and again after blossom leaves dropped with Paris green alone, on apple, plum, and apricot. Results: The fruit was wormy, and some scab was found on the Missouri Pippin and Winesap apples. All the apricots and about two-thirds of the plums were wormy and dropped to the ground before ripening. Grapes were sprayed to prevent the development of black rot, but no difference was discovered between the fruit treated and that not treated.

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EDWARDS COUNTY.—BY L. W. ANGUS, LEWIS.

ORCHARDS.—The condition of all classes of fruit trees was good in 1893, excepting the plum, which was only fair.

Varieties in best condition: Our orchards are quite young and not fully in bearing, but so far the Ben Davis and Missouri Pippin apples, Morello varieties of cherry, seedling peaches and Wild Goose plum have borne quite satisfactorily.

VINEYARDS.—Those of a fruiting age were damaged by a late frost in the spring,

yet at the close of the season were in very good condition. The cane growth was checked by drought. The Concord is most largely planted.

**SMALL FRUITS.**—Condition: Blackberry, good; gooseberry, very good; raspberry, fair; strawberry, very poor.

Varieties most successfully grown: Blackberry, Kittatinny and Lawton lead; the Early Harvest is promising; currant, the native sort; gooseberry, Houghton; raspberry, Turner and blackcap sorts.

**CROPS.**—Orchard fruits were light of all classes, and quality poor.

Small fruits: Very light of all classes, and quality poor, excepting of the native currant, which bore a good crop of good quality of fruit.

**INSECTS.**—The Codlin Moth was not as prevalent as in 1892, but the Apple and Plum Curculio were present in great numbers. Spraying to suppress insects has not been generally practiced.

#### FRANKLIN COUNTY.—By N. M. CHANDLER, OTTAWA.

**ORCHARDS.**—Condition: All classes of fruit trees, where properly taken care of, are in fair to good condition. Some blight was found among pear trees.

Varieties succeeding best: Apple, Willow Twig, Jonathan, Ben Davis, Rawle's Genet, Fameuse; cherry, Early Richmond, Morellos; peach, Hale, Crawford's Early and Heath Cling; pear, Howell, Kieffer, White Doyenne, Bartlett; plum, Wild Goose; quince, all kinds succeed in growth, but are not fruitful.

The age of trees at declining: Apple, Winesap, Missouri Pippin, Red Astrachan, at 12 to 18 years; cherry, English Morello and most all kinds range from 12 to 20 years; peach, 8 to 12; pears, if escape the blight, 20 years; quince, seldom dies young.

Causes of decline: Apple, from attacks of Round-headed Borers and Root Louse; peach, borers and severe winters; pear, blight; plum, black knot.

Varieties fully tried, and rejected: Apple, Rome Beauty, Milam, Rhode Island Greening, Tompkins King.

**VINEYARDS.**—The condition of vines of a fruiting age is very good. The season's growth, though not strong, is well matured. Black rot appeared in some localities, but not to a severe extent.

The most successful varieties are the Concord, Worden, Pocklington—in fact, about all the old, established sorts.

**SMALL FRUITS.**—Condition: Blackberry, raspberry, damaged by the winter of 1892 and 1893; all other classes, good.

Varieties most successfully grown: Blackberry, Kittatinny, Snyder; currant, White Grape, Cherry; gooseberry, Houghton; raspberry, for early, Hopkins; late, Gregg; strawberry, Wilson's Albany, Crescent, Sharpless, Robinson. These are the most profitable market sorts.

**CROPS IN 1893.**—Orchards of all classes, light, and quality very poor generally.

Small fruits: Grape, currant, and strawberry, medium; all others light; in quality, generally good. In market grade, grapes 60 per cent., blackberries 50 per cent., currants 100 per cent., gooseberries 75 per cent., strawberries 50 per cent., were first class. The raspberries were all second class.

**INSECTS** were as prevalent as in preceding years. Spraying was practiced to some extent, with partial success.

#### GREELEY COUNTY.—By HENRY WEAVER, TRIBUNE.

G. C. Brackett, Secretary:

I have your circular No. 1, for 1893, requesting a report of condition of fruit trees, etc., in this county. I can only answer in a general way as follows:

All trees are in about the same condition, alive, and appear reasonably healthy.

Some have perished during the season, owing to severe drought of 15 months, broken by only one rainfall sufficient to penetrate the ground to the roots of trees.

HARVEY COUNTY.—By C. A. SEAMAN, SEDGWICK.

**ORCHARDS.**—Condition: Apple, cherry, plum and quince are in good to very good condition; very few peach trees of bearing age are growing; all young seedling trees are healthy; pear trees that have resisted the attacks of blight are in healthy condition.

Varieties in best condition: Apple, Ben Davis, Winesap, Maiden's Blush, Rambo, Grimes's Golden, Early Harvest; cherry, Early Richmond, English Morello, Montmorency, and Common Morello; peach, Alexander, Stump the World, Hale, and selected seedlings; pear, Kieffer, Garber, Angouleme, Clapp's Favorite, Flemish Beauty, Bartlett, Louise Bonne de Jersey; plum, Wild Goose, Miner, Mariana; quince, Orange.

New varieties introduced that are promising: Apple, Gano, Arkansas<sup>Black</sup>, Yellow Transparent; cherry, Wragg, Ostheim; pear, Garber, Early Harvest; plum, Botan, Simoni.

Varieties fully tried, and rejected: Apple, most of the Russian sorts, on account of blighting; cherry, sweet kinds; peach, the whole list of foreign origin; varieties originating in this locality succeed; pear, Idaho; plum, Blackman, and most all of European origin; quince, Champion, Missouri Mammoth, Rea, all are very liable to blight.

**VINEYARDS.**—The present condition of vines of a bearing age is good. Black rot has not attacked the fruit. Concord, Draout Amber, Elvira, Moore's Early, Niagara, Pocklington, Worden, are most successful. The Moore's Diamond is a new, promising sort.

**SMALL FRUITS.**—Condition: Blackberry and currant, fair; all others in poor condition.

Varieties most successfully grown: Blackberry, Early Harvest, Kittatinny, Lucretia dewberry; currant, Red Dutch, Cherry, Fay; gooseberry, Houghton, Downing, Smith; raspberry, Souhegan, Ohio, Gregg; strawberry, Captain Jack, Crescent, Parker Earle, Champion, Edgar Queen.

**CROPS IN 1898.**—Orchards: All classes were light, excepting pear and quince, which were medium. In quality, all were good, excepting the apple. In grade, 25 per cent. of the apple crop, 40 per cent. peach, 75 per cent. pear, plum, and quince, were first-class market fruit.

Small fruits: All classes light, excepting the grape and currant, which were medium. In quality, all were good, excepting raspberry and strawberry, which were poor. The crops of all were first-class market fruit, excepting the grape, of which only one-fourth would sort into a first-class grade.

**INSECTS.**—The Codlin Moth, Plum Curculio and Apple Curculio were as prevalent as in preceding years.

Spraying with insecticides and fungicides was practiced successfully, when proper attention was given to the applications.

JOHNSON COUNTY.—By J. C. BECKLEY, SPRING HILL.

**ORCHARDS.**—Condition: Apple trees, very good—better than common; cherry, young trees good, old ones failing; all other classes good, excepting the pear, which is poor.

Varieties in best condition: Apple, Rawle's Genet, Willow Twig, Winesap, Maiden's Blush, Gilpin, Smith's Cider; cherry, Early Richmond, English Morello, Mont-

morency, Wragg; peach, seedlings originating in the county; pear, Kieffer, Bartlett, Flemish Beauty, Clapp's Favorite; plum, Wild Goose, Miner, Damson; quince, Orange, Champion, Meech's [Prolific].

Varieties declining at the age given: Apple, Ben Davis, Winesap, Jonathan and Early Harvest at 28 years of age; cherry, May Duke, Governor Wood and Common Morello at 15 years; peach, all budded sorts at 4, and seedlings at 6 to 10 years; pear, nearly all varieties, excepting Kieffer, at 5 years; plum, I have trees 22 years old that show no indications of decline; quinces, Orange at 20 years.

The evident cause of decline: Apple, sun scald, or blight; cherry, fungous growth upon the bark, dry rot of the woody portions; pear and quince, by blight.

Of the new varieties which are promising are the Arkansas Black apple, Wragg cherry, Idaho pear, and Meech's [Prolific] quince.

The following varieties have been fully tried, and fail to give satisfaction: Apple, Ben Davis, Dominie, Fallawater, Rambo, Bellflower, Golden Russet; cherry, May Duke; peach, most all the budded sorts; pear, about all sorts, excepting the Kieffer; plum, all kinds, excepting such as Wild Goose, Miner, and Damson; quince, Orange.

VINEYARDS.—The condition of plantations of bearing age: Very good, excepting such as had been planted on a thin stratum of soil, underlaid with stone.

Concord, Moore's Early, Niagara, Draught Amber, Worden, Pocklington and Delaware succeed, when protected during winter. Victor and Empire State are promising varieties.

SMALL FRUITS.—Condition in spring of 1893: Blackberry and raspberry, poor; currant and gooseberry, good; strawberry, fair.

Varieties most profitable for market purposes: Blackberry, Kittatinny; currant, Red and White Dutch; gooseberry, Houghton, Downing; raspberry, Ohio, Gregg; strawberry, May King, Sharpless.

CROPS IN 1893.—Orchards: Very light of apples and peaches; medium of cherries; an entire failure of all others. The quality was good only of cherries.

Small fruits: Light of all classes, excepting currants and grapes, which were fair. and, in quality, good, while that of the blackberry was poor; gooseberry, raspberry, and strawberry, fair to good.

INSECTS.—The Codlin Moth and Apple and Plum Curculio were as prevalent, in proportion to the extent of fruit borne, as in preceding years.

Spraying with insecticides was practised to some extent, and resulted in considerable benefit. Fungicides were used to some extent, and proved very helpful in checking fungus injury. The light crop of fruit, and continuous rains during the proper season for such work, discouraged many from spraying.

#### KEARNY COUNTY.—By C. H. LONGSTRETH, LAKIN.

ORCHARDS.—Condition: All classes of fruit trees made a slow growth during the early part of the season, owing to drought and a shortage of water for irrigation purposes. There was an abundance of water from July to the closing of the season. and trees of all kinds made a rapid late growth, and were in poor condition to pass the winter.

Pears: The standard class maintains a vigorous and healthy condition; but the dwarf class is not successfully grown.

Apples: York Imperial, Gano, and Arkansas Black, recently introduced, are promising sorts.

VINEYARDS.—The Concord and Niagara are the only sorts planted. Both are

successful in growth and fruitfulness. The black-rot fungus has not, so far, been discovered.

**SMALL FRUITS.**—Owing to drought during the last winter, blackberries and raspberries were in poor condition at the opening of the spring of 1893; currants, the Crandall only is grown, and is a promising sort; gooseberries are healthy and successfully grown; strawberries were a total failure the past season, owing to drought.

Varieties most successful: Blackberry, Kittatinny, Stone's Hardy; the Snyder fails; currant, Crandall; gooseberry, Houghton; raspberry, Gregg, Souhegan, Turner; strawberry, Crescent, Sharpless.

**CROPS IN 1893.**—Orchards: All classes bore a light crop, excepting the cherry, which was good. The quality of all was of the best.

Small fruits were light, but quality good.

Grapes were a heavy crop and of good quality.

**INSECTS.**—None of a noxious character have made an appearance in this locality. There has been no necessity for using insecticides or fungicides thus far.

#### LYON COUNTY.—BY JAMES SIMPSON, ALLEN.

**ORCHARDS.**—The condition of all classes of fruit trees is good to very good.

Varieties in best condition: Apple, there is no discernible difference, all in fine health; of the cherry, Early Richmond and May Duke; peach, no difference; pear, Bartlett, Angouleme; plum, Wild Goose; quince, Orange.

Age at which decline sets in: Apple, 18 to 20 years; cherry, the heart varieties, about 12 years; peach, none live over 20 years; plum, English sorts, 12 to 14 years; quince, at 12 years; and the pear, at any age the blight may attack it. Blight and attacks of borers and neglect are the main causes of decline.

**VINEYARDS.**—The present condition of bearing vines is indeed very good. The Concord still holds the lead as the most satisfactory variety. Black rot has not developed, only in some neglected plantations.

**SMALL FRUITS.**—All plantations which had received proper attention were in very good condition at the opening of spring of 1893.

Varieties most successfully grown: Blackberry, Lawton, Kittatinny, Early Harvest, Wilson Jr.; currant, Red and White Dutch, Cherry; gooseberry, Houghton-Crown Bob, Whitesmith; raspberry, McCormick, Gregg, Cuthbert, Turner; strawberry, Crescent, Captain Jack, Charles Downing, Kentucky.

Most profitable varieties for market purposes: Blackberry, Early Harvest, Wilson Jr.; currant, Red Dutch, Cherry; gooseberry, Houghton, Crown Bob; raspberry, Gregg, Cuthbert; strawberry, Captain Jack, Kentucky.

**CROPS.**—Orchards: Apple, very light; peach, good on high land. All others were a failure.

Small fruits: All classes medium, and only fair in quality.

Grapes were a medium crop, and were fairly good in quality.

About one-half of the crop of each class was marketable product.

**INSECTS** were not as prevalent as in preceding years. Very few growers sprayed with insecticides, but so far as tried it resulted beneficially.

#### MARION COUNTY.—BY J. B. DOBBS, ANTELOPE.

**ORCHARDS.**—Condition: Apple and pear, injured by blight; peach, poor; cherry and plum, fair.

**VINEYARDS.**—Plantations of bearing age are in a fair condition. The season's growth is rather short, owing to drought, but well ripened for winter.

The Concord, Clinton and Moore's Early are the most successful varieties. Goethe is not entirely hardy in this climate.

SMALL FRUITS are not succeeding, on account of the dry summers.

CROPS IN 1893.—Apple, very light; cherry and plum, an entire failure. The peach yielded three-fourths of a crop. The early-ripening varieties were nearly all wormy; later, fair in quality; all others very poor.

Grapes were a medium crop, of fair quality.

INSECTS were not discovered, owing to the scarcity of fruit, excepting in the peach. Therefore, very little spraying was done.

MCPHERSON COUNTY.—BY THEO. BOGGS, MCPHERSON.

(East half.)

ORCHARDS.—The condition of all classes of fruit trees is good.

Varieties that are in best condition: Apple, Ben Davis, Winesap, Rawle's Genet; cherry, Early Richmond, Black Morello; peach, Early and Late Crawford, and seedlings; pear, Louise Bonne de Jersey; plum, Wild Goose; quince, Orange.

VINEYARDS.—The condition of bearing vines is good. Black rot was not prevalent in 1892. The present season vines were injured by drought, but the canes matured well. The Concord is still the leading variety.

SMALL FRUITS IN 1893.—All classes are in good condition. The winter of 1892-'93 injured the blackberry considerably.

Varieties most successfully grown: Blackberry, Lawton, Kittatinny; currant, Red Dutch; gooseberry, Houghton; raspberry, the blackcap varieties generally; strawberry, Wilson's Albany.

CROPS IN 1893.—Orchards: Of apples, pears, plums, quinces, none; cherries and peaches, very light, and quality poor.

Small fruits: Grapes, gooseberries, raspberries, strawberries, light; blackberries and currants, none; the quality of all classes, fair.

INSECTS were not prevalent, and spraying was not practiced. In preceding seasons, whenever properly done, it was successful as a check of such species as were present.

(West half.—By I. F. Talbot, Conway.)

ORCHARDS.—The condition of apple, cherry and peach trees is good; of pear, plum, quince, poor.

Varieties in best condition: Apple, Missouri Pippin, Winesap, Ben Davis, Rawle's Genet, Jonathan; cherry, Early Richmond, Morello; peach, seedlings; plum, Blue Damson, Wild Goose.

The Baldwin, Rambo and Northern Spy apple trees begin to decline at from 8 to 10 years. The evident cause, blight and sun scald.

VINEYARDS IN 1892-'93.—All of a bearing age maintained a good condition. The cane growth was not heavy, but well matured. Black rot was not damaging to the fruit. The Concord still holds the lead as a successful variety.

SMALL FRUITS.—The present condition of the blackberry and strawberry, good; currant and raspberry, poor; gooseberry is not a success. Of the blackberry, the Kittatinny is the most reliable sort, and the Gregg raspberry the best market raspberry.

CROPS IN 1893.—Orchards: The apple, peach and pear were light, and their quality poor; other classes entirely failed.

Small fruits: Grapes and strawberries were a fair crop, and of good quality; blackberries and raspberries, light, and of poor quality; other classes failed.

INSECTS were not prevalent; hence spraying was not practiced.

## MIAMI COUNTY.—BY L. BISHOP, BEAGLE.

**ORCHARDS.**—Condition: The apple and pear, poor; cherry, peach, and plum, fair to good.

Varieties in best condition: Apple, about all kinds in orchards of considerable age; cherry, Early Richmond, English Morello. Montmorency; peach, no difference in varieties of young orchards; pear, Bartlett, Angouleme; plum, most all of the American sorts; quince, Orange.

Varieties tried and rejected: Cherry, all the sweet varieties; quince, Rea, Meech, and Champion.

**VINEYARDS.**—The present condition of plantations of bearing age, fair. Black rot was rather prevalent, as no means was used to check it.

Varieties most successfully grown: Champion, Concord, Pocklington.

**SMALL FRUITS.**—Condition: Blackberry, currant, fair; gooseberry, strawberry, good; raspberry, splendid, with less damaged wood than usual.

Varieties most successfully grown: Blackberry, Kittatinny, Erie, Snyder, Early Harvest; currant, Knight's Red; gooseberry, Houghton; strawberry, Captain Jack, Crescent, Haverland, Bubach No. 5, Parker Earle, Gandy.

**CROPS IN 1893.**—Orchards: All classes light, excepting the pear, which was medium, and of good quality; all others, the quality was poor; peaches, cherries and pears were, about 75 per cent. of their crop, first-class fruit.

Small fruits: Grapes and raspberries, heavy; blackberries and currants, medium; gooseberries and strawberries, light. In quality, all classes were good, excepting strawberries, which were poor. The crop of all classes would grade first class, excepting that of the strawberry, which was largely second class.

**INSECTS.**—The Codlin Moth was not so prevalent as in 1892, but the Plum Curculio was more numerous than ever known before.

Spraying with insecticides or fungicides was not practiced.

## OSAGE COUNTY.—BY H. L. FERRIS, OSAGE CITY.

**ORCHARDS.**—Condition: Apple and peach, fair; plum, good; all others, poor.

The Winesap and Ben Davis apple, Early Richmond cherry and seedling peach trees are in the best condition.

Apple and pear trees suffer through attacks of blight, and the former by the scab fungus. The Gano, York Imperial and Arkansas Black apples, of recent introduction, are promising sorts. Willow Twig, White Winter Pearmain and Rambo have failed to give satisfaction, and are classed among rejected varieties.

**VINEYARDS.**—The condition of vines of bearing age, good. The Concord still leads as the best of varieties planted, though the Niagara promises to be valuable.

Black rot has not prevailed in this locality upon the fruit.

**SMALL FRUITS.**—Condition in 1893: Of the blackberry, raspberry, and strawberry, good; all others, poor.

**CROPS IN 1893** were light of all classes of orchard fruits. The pear, a total failure. In quality, all were poor, excepting cherries, which were good. About 60 per cent. of the apple, 80 per cent. of the cherry and 25 per cent. of the peach crop was marketable fruit.

Small fruits: Blackberries and raspberries were a medium and strawberries a good crop. In quality, all were good. About 100 per cent. of the blackberry and raspberry crop and 75 per cent. of the strawberry was marketable.

**INSECTS.**—The Codlin Moth and Apple and Plum Curculio were as prevalent as in preceding years. Spraying has been beneficially practiced to check their damaging the crops in former years. Fungicides have not been used to any extent.

RENO COUNTY.—By B. P. HANAN, ARLINGTON.

(South half.)

The year 1893 has been the dryest of the 18 of my residence in Reno county. We have not had a good rain during the year—that is, one to wet the ground down thoroughly. I had a well dug in September, and went down seven feet before striking any moisture. And we had a great many very hard winds, especially in the spring and summer. The spring was cold and backward.

Most all kinds of fruit trees bloomed well, but about all the young fruit which set soon sickened and fell off, except peaches. The peach trees matured a full crop, from the middle of Reno county south to the south line of the state; and where on low lands which had an underflow of water, or on artificially irrigated lands, the fruit was large and nice; but on much of the high, dry lands the peaches were small and shriveled, and were badly infested with worms.

The apple, pear, cherry, plum and apricot crop was the nearest a complete failure that I have known since our trees first came into bearing.

Strawberries were injured so often by spring frosts that the crop was light.

Raspberries and blackberries were injured on most farms by the severe drought, but by constant cultivation I had the best-paying crops of both that I ever had in Kansas.

Juneberries (dwarf) were full as usual. There are several varieties of dwarf juneberries, and there is a big difference in the size, taste and productiveness of the varieties.

Crandall currants bore very full, as usual. They and the wild sorts are the only kinds that will bear here in paying quantity. The Crandall is destined to be extensively grown in the dry regions of the West, where the red and white kinds fail. They are as good when green for pies and jellies as gooseberries.

Gooseberries failed, on account of the spring frosts.

Grapes were never better. No rot or other disease in fruit or vine. Bacchus, Clinton, Concord, Duchess, Lady Washington and Norton led the rest, but Delaware, Elvira, Niagara, Noah, Wilder, Worden and some others were extra good.

If people will adopt a system of irrigation, by storing surplus water in ponds, or by wells and windmills to pump the water from our great underflow into ponds and vats for use in droughts, I believe that we can have all the fruits and vegetables adapted to this latitude that we need for family use, and it might be made profitable on a large scale, as we have the natural soil for it.

RICE COUNTY.—By R. H. DAY, LYONS.

ORCHARDS.—All classes of fruit trees are in good condition, excepting the peach, most of which are on a decline.

Varieties in the best condition: Apple, Ben Davis, Missouri Pippin; cherry, Early Richmond, English Morello; peach, seedlings are generally in better condition than those commonly known as the "budded varieties," and are more reliably productive; pear, the Bartlett seems to hold its superiority over all others; plum, Wild Goose and Native Sand.

Neglect, poor cultivation, borers and extreme cold weather are the main causes for decline of orchards.

VINEYARDS.—The present condition of all three- to five-year-old vines, good. Older vineyards were almost destroyed by some kind of a worm, which commenced its attack at the extremities of the canes. Black rot has not been prevalent. The old reliable Concord is most extensively grown.

SMALL FRUITS IN 1893.—Blackberry and gooseberry plants are in good condition; raspberry and strawberry, poor.



Varieties most successful: Blackberry, Snyder; gooseberry, Houghton; strawberry, Captain Jack.

**CROPS IN 1893.**—Orchards: Of apples, cherries, and pears, very light; peaches, one eighth of a crop. In quality, apples and cherries, poor; peaches and plums, good.

Small fruits: In quantity, light of all classes; quality, grapes fair; raspberries and strawberries, poor.

**INSECTS.**—The Codlin Moth, Plum Curculio and Apple Curculio were quite numerous the present year. But spraying with insecticides prevented their damaging the fruit. This treatment, wherever used, has given satisfaction.

**RUSH COUNTY.—BY C. P. HART, RUSH CENTRE.**

**ORCHARDS.**—Condition: All classes which have received good culture are in good condition, excepting pear trees, which are poor.

**VINEYARDS** are a thing of the past, having been killed out by dry, hot weather.

**SMALL FRUITS** have suffered the same as the grape.

**CROPS.**—All classes of fruit trees bloomed profusely in spring of 1893, but the crop was cut off by a hard freeze in May.

Spraying with insecticides and fungicides has not been tried.

**STAFFORD COUNTY.—BY J. B. SMITH, ST. JOHN.**

**ORCHARDS.**—Condition: Bearing fruit trees of all classes, generally good, excepting the pear, which is rather poor. Young apple trees were seriously injured by the borer during the season.

Varieties in best condition: Apple, Carolina June, Cooper's Early, Ortley, Yellow Bellflower, Smith Cider, Winesap, Missouri Pippin, Ben Davis, Rawle's Genet; cherry, English Morello; peach, selected seedlings.

Varieties fully tried, and rejected: Apple, Yellow Bellflower, Willow Twig, Huntsman, Hubbardston.

**VINEYARDS.**—The condition of the bearing vines, very good in 1892 and the present year. Black rot was not found on the fruit. The Concord is the most successful sort.

**SMALL FRUITS IN 1893.**—Blackberry and raspberry canes were considerably damaged by the rabbits, by gnawing off the bark during the last winter; gooseberry and strawberry, in good condition.

Varieties most successfully grown: Blackberry, Early Harvest, Kittatinny, Lawton; raspberry, McCormick (syn. Mammoth Cluster).

**CROPS IN 1893.**—Orchards: Apple and cherry, light; quality, poor; peach and pear, medium. The quality of peaches, good; pear, poor.

About 50 per cent. of the apples, 75 per cent. of the peaches and 25 per cent. of the pears were marketable fruit.

Small fruits: Grape and gooseberry, rather light; blackberry and raspberry, medium. The grapes, blackberries and raspberries were of good quality; gooseberries, rather poor.

About 75 per cent. of the grapes and 90 per cent. of the blackberries and raspberries were good, marketable product.

**INSECTS** were fully as prevalent as in previous years.

Spraying with London purple was practiced by only a few. The result was beneficial.

**ORCHARDS.**—Condition: All classes of fruit trees are in good condition, excepting the peach, which generally is allowed to take care of itself.

Varieties in best condition: Apple, Ben Davis, Rawle's Genet, Missouri Pippin, Gano, Grimes's Golden, Oldenburg, Jonathan, Wealthy, York Imperial; cherry, English Morello, Late Richmond, Dyehouse; peach, Crawford's Early and Late, Alexander, Elberta, Crosby; pear, Bartlett, Sheldon, Howell, Seckel, Buffum, Kieffer, plum, Abundance, Burbank, Wild Goose; quince, Orange, Champion.

Age at which some varieties begin to decline: Apple, Missouri Pippin, Winesap and Smith's Cider at 12 years; peach, nearly all at 5 to 6 years; pear, nearly all of the standard class blight at the first fruiting. Dwarfs give much better satisfaction.

**VINEYARDS.**—Condition: Where given proper attention, good. The prospect of a full crop of fruit, in the early part of the season, failed, owing to a late spring frost; and the vines did not make the usual wood growth in 1898. Only one instance of the fruit being attacked by the black-rot fungus occurred during the season.

Varieties most successfully grown: Concord, Niagara, Pocklington, Empire State.

**SMALL FRUITS.**—All classes were in an injured condition at the opening of the spring of 1898.

Varieties most successfully grown: Blackberry, Snyder, Champion, Erie; currant, Cherry, White Grape, Fay; gooseberry, Downing, Houghton, Industry; raspberry, Gregg, Cuthbert; strawberry, Jessie, Crescent, Sharpless, Bubach.

**CROPS IN 1898.**—Orchard: Apples, good only in a few favored locations; cherries, one-half crop; peaches, full crop of both seedlings and budded sorts; pears, very scattering; plums and quinces, a failure.

In quality, all were good, excepting the apples, which were poor, and only a second- and third-class grade. Three-fourths of the cherries and one-fourth of the peaches would grade first class; all others, second class.

Small fruits: All classes yielded a light crop, and all were poor in quality, excepting the currants, which were good.

Grapes yielded half to two-thirds of a crop, which, in quality, was only fair

**INSECTS.**—In a majority of orchards, very little spraying was done to suppress insects, owing to the very light crop of fruit; but, wherever tried, it resulted beneficially. Fungicides have been used, and, when properly applied, were beneficial.

## SOUTHERN FRUIT DISTRICT.

ALLEN COUNTY.—By B. F. PANCOAST, IOLA.

**ORCHARDS.**—Condition: All classes of fruit trees are generally in good condition, excepting the pear and quince, many trees of which are injured by blight.

Varieties in best condition: Apple, Ben Davis, Winesap, Missouri Pippin, Shannond,\* Stark, York Imperial, Primate, Red Astrachan, Jonathan, Grimes's Golden; cherry, Late Montmorency, English Morello, Early Richmond; pear, Seckel, Angouleme, White Doyenne; plum, Wild Goose, Miner.

Promising varieties recently introduced: Apple, Shannon, Sol. Edwards; cherry, Late Montmorency; peach, Elberta.

\* Ohio Pippin.

**VINEYARDS.**—Bearing vines are in good condition, and made a better cane growth than that for 1892. The Concord, Early Victor, Dracut Amber, Agawam and Elvira are most successfully grown. Empire State is a promising variety recently introduced.

**CROPS.**—Orchards: All classes bore a very light crop, excepting the cherry, which was medium. In quality, all were poor, excepting cherries, which were good, and peaches, fair.

**Small fruits:** Blackberry and raspberry plantations yielded a fair crop, but all others were light. In quality, all were good, excepting the strawberry, which was poor.

Grapevines bore a medium crop, of good quality.

Ninety per cent. of the grape and blackberry, 60 per cent. of the raspberry and 10 per cent. of the strawberry crop was marketable fruit.

**INSECTS.**—The Plum Curculio seemed more numerous than usual, and the same might be said concerning the Codlin Moth. But in years when fruit is scarce it is difficult to accurately determine, for all the fruit becomes infested.

**Spraying with insecticides:** A great many of the fruit growers prepared themselves to do a general work in this line, but the failure of crops rendered it unnecessary. Our people believe it will pay. Apple scab is increasing very much, but no means has been used to check it.

#### BARBER COUNTY.—By E. T. DANIELS, KIOWA.

**ORCHARDS.**—Apple and quince trees generally are in poor condition; cherry, fair; peach (young trees), good; pear, healthy and vigorous on low land, otherwise rather poor; plum, healthy.

Of varieties of apples, the Ben Davis, Winesap, Jonathan, Rambo, Smith's Cider, May, Lansingburg and Arkansas Black are in the best health; cherry, Early Richmond, Morello, Montmorency; peach, all varieties; pear and plum, all kinds planted are in good condition. The quince suffered the present year from a leaf rust.

Of the apples, the Lawver is deficient in its root development, therefore fails quite young, and has been rejected.

Varieties recently introduced, which are promising: Apple, the May. This succeeds best on upland of any tried; three-year-old trees fruited the present year. Cherry, Montmorency; peach, Pratt, Reeves's Favorite, Lady Ingold, Elberta, Bishop, Pansy, bore fine fruit. The Wonderful is not fully a satisfactory sort. The Wilder pear, Abundance, Spaulding, Satsuma plum, and Meech's quince, are fine growers.

**VINEYARDS.**—Bearing vines are in rather poor condition, owing to burning of their foliage during a hot spell of weather, and the attacks of a vine hopper, other insects, and fungus attacks. Black rot appeared in a light form upon the fruit.

Of all varieties fruited, the Dracut Amber endures heat and drought with least injury. The Wilder, Triumph, Highland, Empire State, Agawam and Brighton also succeed. The Carman is on trial. Its wood growth was fair, and well ripened when winter set in.

**SMALL FRUITS.**—Condition: Blackberry, sound and healthy; currant, gooseberry, strawberry, poor. Of the raspberries, the Palmer maintained a good condition, while the Gregg and Shaffer were injured.

**CROPS.**—Orchards: Very light of all classes, and quality poor, excepting of the cherry, which was good.

**Small fruits:** The crop was medium of blackberries; of raspberries, the Palmer yielded a full crop. In quality, these crops were good.

**INSECTS.**—The Codlin Moth has not been numerous in this locality, and the Plum Curculio was not as prevalent as in 1892. Insecticides have not been used, but the fungicide Bordeaux mixture, applied to grapes, was very beneficial.

**ORCHARDS.**—Condition: All classes of orchard trees, good.

Varieties in best condition: Apple, Benoni, Maiden's Blush, Fameuse.

The Winesap begins to decline at about eight years from planting. Caused by overbearing.

New varieties introduced that are promising: Apple, Mammoth Black Twig, Arkansas Black, Yellow Transparent; peach, Champion, Crosby, Elberta; quince, Missouri Mammoth.

**VINEYARDS IN 1898.**—The present condition of vines of a bearing age is very good. The cane growth is an average of other years and well matured.

Varieties most successful: Concord, Niagara, Pocklington, Moore's Early, Worden, Ives, in the order named.

**SMALL FRUITS IN 1898.**—All classes are in fair condition.

Varieties most successfully grown: Blackberry, Kittatinny, Early Harvest; gooseberry, Houghton; raspberry, Gregg, Souhegan, McCormick, Cuthbert, Turner; strawberry, Crescent, Captain Jack, Cumberland. Of these, the Early Harvest blackberry, Houghton gooseberry, Gregg, Cuthbert raspberry, Crescent, Captain Jack strawberry, are the most profitable sorts for market purposes.

**CROPS IN 1898.**—Orchards: Nearly all classes failed in yielding a crop. There was a fair crop of Kieffer and Bartlett pears.

Small fruits: All classes bore lightly, excepting the grape, which was an average of other years. In quality, all were fair to good, excepting currants and gooseberries. The product of blackberry, grape, raspberry and strawberry was largely first-class fruit for market.

**INSECTS** were not discovered to be numerous. Spraying was prevented by the continuous rains during spring, when it should be done.

BUTLER COUNTY.—By E. C. RICE, AUGUSTA.

(North half.)

**ORCHARDS.**—The present condition of all classes of fruit trees is good, excepting the pear, which is rather poor.

There is no discernible difference in the condition of varieties, excepting in pear and quince, which were damaged by blight.

A very few varieties of apples, as the Stark and Rhode Island Greening, begin to decline at 15 years of age, and all varieties of peaches at from 10 to 15 years. The causes for the apple are hot sun and insect depredations; for the peach, internal rotting of its wood and borers.

The Stark, Rhode Island Greening, Willow Twig, Rawle's Genet, Baldwin and Spitzenberg apples, Crawford's Early and Late and Foster peaches, and others known to be tender, have been rejected as unsatisfactory, after being fully tried.

The Blackman plum fails in this locality.

**VINEYARDS.**—The present condition of bearing vines is good. Concord, Niagara, Draught Amber and Moore's Early are the most successful varieties. Their fruit has not been damaged by the black-rot fungus.

**SMALL FRUITS.**—The present condition of plantations of blackberry, raspberry and strawberry is poor; of the gooseberry, good.

The Kittatinny blackberry, black currant, Houghton gooseberry, McCormick and other blackcap varieties of the raspberry, are the most successful kinds grown in this locality.

**CROPS.**—Orchard: All classes very light, excepting of the peach, which was medium. In quality, all were poor.

Of small fruits, all classes totally failed in fruiting.

Grapes were a medium crop, and, in quality, good, and first-class marketable product.

**INSECTS.**—The Codlin Moth and Plum Curculio were numerous, and the peach crop was nearly all affected by them. Spraying with arsenic, one pound to eight barrels of water, has given highly satisfactory results in protection of the foliage, but not in effects upon the Codlin Moth. There has been no occasion to use fungicides in this locality as yet.

(*South half.—By Dr. William Snyder, Towanda.*)

**ORCHARDS.**—Condition: All well-cared-for orchards of apple, cherry and plum trees are in good condition. Peach trees are not so healthy, and pears are rather poor. The quince has not been successfully grown.

Varieties in best condition: Apple, Ben Davis, Missouri Pippin, Winesap, Gilpin, White Winter Pearmain, Rome Beauty, Jonathan, Grimes's Golden, McIntosh Red, Wealthy, Oldenburg, Dominie, Carolina June, Summer Queen, Whitney; cherry, Early and Late Richmond, Common Morello; peach, no discernible difference in varieties; pear, Kieffer, Howell, Le Conte; plum, Wild Goose, Miner, Mariana.

Age at which varieties decline: Apples, such as Willow Twig, Rawle's Genet, Early Harvest, Talman, 20 years; pear, Bartlett, Angouleme, Seckel, 16 years. The evident cause, blight and neglect.

Varieties recently introduced, which are promising: Apple, Mammoth Black Twig, Arkansas Black, Wolf River; cherry, Rocky Mountain Dwarf; peach, Champion.

Varieties fully tried, which fail to give satisfaction: Apple, Willow Twig, Rawle's Genet, Early Harvest, Yellow Bellflower, Red Astrachan; cherry, nearly all varieties, excepting those above named; peach, Crawford's Early and Late, Stump the World, and the Mixons; plum, all but Wild Goose and Miner.

**VINEYARDS.**—The present condition of those of bearing age is good to very good. The varieties Concord, Worden, Moore's Early and Niagara are most successfully grown, and have not been injured by the fungus causing black rot.

**SMALL FRUITS.**—The present condition of blackberry and strawberry plantations is fair to good, while that of other classes is poor.

Varieties most successful: Blackberry, Snyder, Kittatinny, Early Harvest; gooseberry, Houghton, Downing; raspberry, Gregg; strawberry, Downing, Crescent, and these are the best varieties for market purposes.

**CROPS.**—Orchards: Of the apple and cherry, light; peach, medium; all others, a failure. In quality, all were poor; all were second-grade product.

Small fruits: All classes bore a light crop, which was poor in quality, excepting of strawberries, which was good.

Grapes were a heavy crop, and good in quality.

Grade of the crops: Strawberries, 40 per cent. first class, 60 per cent. second class. All others graded second class. Grapes, 100 per cent. first class.

**INSECTS** were as prevalent as in preceding years. Spraying to suppress them has been practiced, with good results. Fungicides have not been used.

CHAUTAUQUA COUNTY.—By D. C. BALDWIN, HEWINS.

**ORCHARDS.**—Condition: Apple, plum and quince trees are in fair condition; all other classes are injured more or less.

Of apples, the Missouri Pippin, Winesap, Maiden's Blush, Early Harvest and Wagener are in the best condition; cherry, most of the Morello family and May Duke; peach, native seedlings; plum, Wild Goose, Miner, and some of the Green Gage; quince, Orange.

**VINEYARDS.**—Bearing vines in well-cared-for plantations are in a fair condition. The cane growth is light but generally sound and healthy. Concord, Ives and all the dark-colored varieties succeed. Grape rot has not become prevalent in this locality.

**SMALL FRUITS.**—All classes were injured by the protracted drought, unusual in this locality.

**CROPS.**—All classes failed to yield a good crop in 1893, which, in quality, was fair of the apple and poor in all others.

**Small fruits:** The crop was unusually light, and poor in quality, excepting of the blackberry, which was fair; grapes were a fair crop, and good in quality.

**INSECTS.**—The Codlin Moth was prevalent, and efforts to check it by spraying with an insecticide were successful.

There is no need of using fungicides in this locality at present.

CHEROKEE COUNTY.—By D. S. FREEMAN, COLUMBUS.

(North half.)

**ORCHARDS.**—Condition: Apple, peach and pear trees in poor condition; cherry and plum, fair.

Varieties in best condition: Apple, Ben Davis, Missouri Pippin, Winesap, Maiden's Blush, Early Harvest, Carolina June, Jonathan; cherry, Early Richmond, English Morello, Olivet, Black Tartarian; peach, Large Early York, Late Crawford, Heath Cling, Golden Acme, Amsden, Alexander, Smock, Arkansas Traveler; pear, Angouleme; plum, Wild Goose, Weaver, Mariana, Miner; quince, Orange.

Age at which some varieties decline: Apple, Yellow Bellflower, Rambo, Gilpin, Winesap, Missouri Pippin, at 20 years; pear, generally at 18 to 20; plum, Damson, Green Gage, Lombard, German Prune, planted 18 to 20 years ago, are most all dead. The cause is mainly neglect. Blight has hastened the death of some sorts of apple and pear trees.

Varieties recently introduced, which are promising: Apple, Arkansas Black, Mammoth Black Twig; peach, Acme, Governor Garland, Foster; pear, Idaho—not exempt from blight, as claimed.

**VINEYARDS.**—Present condition of vines of a bearing age, where properly taken care of, fair. Black rot has not made its appearance in this locality.

Varieties most successful: Concord, Dracut Amber, Clinton, Ives, Moore's Early, Niagara, Lady, Martha, Elvira. The Brighton, recently planted, is promising to succeed.

**SMALL FRUITS IN 1893.**—Condition: Blackberry, good. All others are only in fair condition, excepting the strawberry, which is very poor; many plantations appear entirely worthless.

Varieties most successfully grown: Blackberry, Kittatinny, Snyder, Early Harvest.

**CROPS IN 1893.**—Orchard: Apple, very light; cherry and quince, fair; plum, good; peach, almost an entire failure. In quality, apples and peaches, worthless; cherries, plums, good; pears and quinces, fairly good. All of the crop of cherries and 75 per cent. of the plums was first-class market fruit.

**Small fruits:** The crop of grapes and blackberries, medium; currants and gooseberries a full crop, and raspberries and strawberries three-fourths of a crop. In quality, all classes were good. One-half of the grape crop, 75 per cent. of the blackberry, all of the currant, gooseberry and raspberry and 50 per cent. of the strawberry crop were first-class market fruit.

**INSECTS.**—The Codlin Moth and Apple and Plum Curculio were as prevalent the present season as in preceding ones. A very few growers have sprayed with London purple. Good results followed its use.

(*South half.*—By T. W. Smith, Baxter Springs.)

ORCHARDS.—Condition of apple, quince and pear trees, poor; cherry, peach, and plum, good.

Varieties in best condition: Apple, Ben Davis, Missouri Pippin, Winesap, Rome Beauty, Jonathan; cherry, Early Richmond, English Morell6; peach, Stump the World, Large Early York, Ward's Early, Ward's Late, Early Crawford, Late Crawford, Early York; plum, Wild Goose.

Hindrances to success: Of the apple, twig blight; peach, rotting of the fruit at ripening season; pear and quince, blight; plum, the curculio.

VINEYARDS.—The condition of bearing vines was good. Concord, Niagara and Pocklington are the most successfully grown.

SMALL FRUITS.—The condition of plantations in the spring was not good of any of the classes.

CROPS IN 1898.—Apple and cherry, light; peach, about one-third; plum (Wild Goose), about 80 per cent.

In quality, apple and plum, good; cherry, poor; peach, of varieties named above, good. Of apples, about 75 per cent., cherries, 90 per cent., peaches, 50 per cent., and plums, 90 per cent., were marketable.

Small fruits: Blackberries, light; gooseberries, heavy; grapes, medium—in quality, good. Of grapes, 75 per cent., blackberries, 10 per cent., and gooseberries, 100 per cent., were good, marketable fruit.

INSECTS.—The Codlin Moth and Apple and Plum Curculio were not as prevalent as in preceding years.

Spraying with insecticides was practiced with good results in the apple orchard by some orchardists, although it was not a success in mine. Spraying with fungicides was followed with good results, but their use was not general.

CLARK COUNTY.—BY CHAS. G. BOON, ASHLAND.

I do not know of any fruit being grown in this county in 1898, excepting the wild black currant, which is listed by nurserymen as the Crandall. This variety bears here almost every year, and the fruit is large and fine.

Strawberries have about all died this summer, and other fruits are damaged by the drought. For the last two years I have had quite a good many varieties of strawberries. Those which bore the best were the Jessie, Captain Jack, Vineland, and Kentucky. But I do not think there is a plant now alive. We have not had a rainfall since last autumn sufficient to wet the ground two inches deep. The outlook is very discouraging.

CRAWFORD COUNTY.—BY JOS. REYNOLDS, FARLINGTON.

(*North half.*)

ORCHARDS.—Condition: Apple, cherry and dwarf pear trees, good; young peach and plum trees, very good; standard pear trees, poor.

Varieties in best condition: Apple, Ben Davis, Missouri Pippin, Jonathan, Maiden's Blush, Carolina June, Oldenburg, Winesap, Grimes's Golden; cherry, Early Richmond, English Morello; peach, Old Mixon Free, Stump the World, Alexander, Old Mixon Cling, Heath Cling, Ward's Late (Free), Stedly; pear, (Duchesse de) Angouleme, Louise Bonne de Jersey; plum, Wild Goose, Miner.

Varieties tried and rejected: Apple, Yellow Bellflower, Stark, Northern Spy.

VINEYARDS.—The present condition of bearing vines is very good. Black rot has developed in some localities, but no means has been used to check it.

Varieties most successful: Concord, Pocklington, Ives, Delaware, Hartford, etc.

Of the newly-tried sorts, the Pocklington is the most desirable.

**SMALL FRUITS.**—Condition: Blackberry and strawberry, poor; gooseberry and raspberry, good.

Varieties most successfully grown: Blackberry, Kittatinny, Snyder; gooseberry, Houghton, Downing; raspberry, Gregg, Doolittle, McCormick (syn. Mammoth Cluster), Turner; strawberry, Charles Downing, Crescent, Captain Jack, Jessie.

**CROPS IN 1893.**—Orchards: Of all classes light. Peaches and plums were an entire failure. The quality was poor, excepting of cherries, which was good.

Small fruits: Blackberries and gooseberries were a fair crop; raspberries and strawberries, light. The quality was good of the blackberry and gooseberry, but poor of all others. Grapes were a heavy crop and of good quality. About 80 per cent. of the grape, 100 per cent. of the gooseberry and 80 per cent. of the raspberry crop was good, marketable product.

**INSECTS.**—Such as attacked the orchard fruits were, seemingly, as prevalent as in former years, owing to the very light crops.

Spraying has not been practiced to control insects, that I am aware of, in the county.

(*South half.*—By L. M. Howard, Girard.)

**ORCHARDS.**—All classes of fruit trees made a good wood growth. Did not discover any material difference in varieties.

**VINEYARDS, 1892 and 1893.**—Plantations are generally in good condition. Black rot attacked the fruit on some vines.

Varieties most successful: Concord, Agawam, Niagara, Moyer.

**SMALL FRUITS.**—Condition in spring of 1893: Blackberry, largely killed by rust; currant and strawberry, good; gooseberry and raspberry, poor.

Varieties most successful: Blackberry, Early Harvest, Erie, Kittatinny, and Lawton (rusted); currant, Red Dutch, Fay; gooseberry, Houghton; raspberry, McCormick (syn. Mammoth Cluster), Gregg; strawberry, Bubach No. 5, Captain Jack, Gandy, Crescent.

For profitable market varieties, the Early Harvest blackberry, Red Dutch and Fay currant, Houghton gooseberry, Turner, McCormick and Gregg raspberry, Bubach No. 5, Captain Jack, Gandy and Lovett's Early strawberry, are the best.

For early ripening, Early Harvest blackberry, Turner and McCormick raspberry, Bubach No. 5, Captain Jack and Lovett's Early strawberry; late, Gregg raspberry, Gandy strawberry.

**CROPS IN 1893.**—Of all orchard fruit, very light and poor in quality.

Of small fruits, light, excepting the raspberry, which was about a half of a crop, and the quality poor.

**ELK COUNTY.**—By D. C. HARKNESS, HOWARD.

**ORCHARDS.**—Condition: Of the apple, pear, and quince, poor; cherry, peach, and plum, good.

Varieties in best condition: Apple, Ben Davis, Missouri Pippin, Maiden's Blush; cherry, Early Richmond, English Morello; peach, Amsden, Arkansas Traveler, Smock, Heath Cling, Crawford's Late; plum, Wild Goose.

There is no evidence of declining of orchard trees from age in this county.

**VINEYARDS.**—Grapevines of a bearing age are in good condition. The black-rot fungus has not been prevalent on the fruit. Concord, Moore's Early and Pocklington are the most successful varieties.

**SMALL FRUITS.**—The condition of plantations of all classes was poor when the spring of 1893 opened.



Varieties most successfully grown: Blackberry, Kittatinny, Snyder; gooseberry, Houghton; raspberry, Gregg.

CROPS IN 1898.—Orchards: Apples and pears, light; cherries, peaches, and plums, medium; quinces, a failure. In quality, all were poor, excepting cherries, which were good.

Small fruits: The blackberry and gooseberry only fruited lightly. Others failed entirely.

Grapes were a medium crop and of good quality.

Spraying: Only a few growers have tried spraying with insecticides, and they are pleased with the results.

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HARPER COUNTY.—By JOHN BAILEY, HARPER.

(North half.)

ORCHARDS.—Condition: All classes of fruit trees are in poor condition, owing to a severe storm in May, from which they have not recovered.

Age at which some varieties begin to decline: Apple, Rome Beauty, White Winter Pearmain, Bailey's Sweet, at about 11 years. They are not adapted to the climate. Other classes show no evidence yet of decline.

VINEYARDS.—The present condition of vineyards of fruiting age is good. Black rot was not prevalent on the fruit.

The crop was about one-third of an average, being much damaged by the storm on May 27. All other fruit crops were ruined by the same storm and late spring frosts, and a continued drought, unequalled during the last 16 years.

INSECTS were as numerous as in preceding years, owing to the neglect of the people to use means for their suppression.

(South half.—By L. Carson, Anthony.)

ORCHARDS.—All classes of fruit trees are in a fair to good condition. The wood growth of all classes, though not large, is healthy. Quince trees should be mulched or manured to succeed in this locality.

The Elberta peach, recently introduced, is a promising variety.

VINEYARDS that have been well cultivated are in a fine condition. The Concord is most generally planted, and leads all others, but many others are growing satisfactorily. No diseases have developed in our vineyards.

Of the new varieties being tried, the Moyer, Moore's Diamond and Worden are most promising.

SMALL FRUITS are generally in fair condition. The Snyder and Kittatinny blackberry, Downing and Houghton gooseberry, Tyler and Souhegan raspberry, and Jessie, Crescent, Windsor, Chief and Captain Jack strawberry, are the most successful varieties.

CROPS of all classes of orchard fruits were light the past year, excepting of peaches, which was fair.

In quality, apples and peaches were good; all others, poor.

Small fruits yielded a light crop, of poor quality of fruit. Grapes, when cultivated, yielded a heavy crop, of good quality.

Spraying has resulted successfully in checking the depredations of insects.

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KINGMAN COUNTY.—By W. L. BROWN, KINGMAN.

ORCHARDS.—Condition: Apple, fair, growth small, on account of extreme drought; cherry, good; peach, fairly healthy, growth medium; pear, fair, some blight appeared on standards, none on the dwarfs; plum, good. This is the home of the plum.

Varieties in best condition: Apple, Ben Davis, Missouri Pippin; cherry, Early Richmond, English Morello; peach, Amsden, Crawford's Late, Heath Cling; pear, Bartlett, Flemish Beauty, Howell; plum, Wild Goose, Chickasaw, Miner.

The oldest apple orchards in the county are only 15 years from planting.

VINEYARDS.—The present condition of bearing vines is very good. Black rot has not developed in this locality.

Varieties most successful: Concord, Niagara, Pocklington, Worden, Moore's Early. This is a favorable climate for the grape, and all varieties tried have succeeded.

SMALL FRUITS IN 1893.—Condition: Blackberry, only fair; all others are in good condition.

Varieties most successfully grown: Blackberry, Kittatinny, Early Harvest; gooseberry, Downing; raspberry, Gregg, Hopkins; strawberry, Captain Jack, Crescent, Glendale.

The Kittatinny blackberry, Downing gooseberry, Gregg raspberry and Crescent strawberry are the best market sorts.

Early ripening varieties: Early Harvest blackberry, McCormick raspberry, Crescent strawberry.

Varieties for late ripening: Kittatinny blackberry, Gregg raspberry, Glendale strawberry.

CROPS IN 1893.—Orchards: All classes were light, excepting peach, which were medium. In quality, were poor, excepting peaches and pears, which were fairly good.

One-fourth of the crop of apples and plums, one-half of the cherries and pears and three-fourths of the peaches were first-class market fruit.

Small fruits; Grape, heavy; blackberry and gooseberry, light; raspberry and strawberry, medium. In quality, grapes, raspberries and strawberries were good; blackberries and gooseberries, poor. About 80 per cent. of the grapes, raspberries, and strawberries, and 75 per cent. of the blackberries and gooseberries, were first-class market fruit.

INSECTS.—The Codlin Moth, Plum Curculio and Apple Curculio were as numerous as in preceding years. Spraying with London purple was practiced to some extent, but not so thoroughly as it should be. Hence, the results were not very satisfactory.

#### KIOWA COUNTY.—By D. MORRISON, GREENSBURG.

ORCHARDS.—All classes of trees were in fair condition. About one-half of all the trees planted in 1893 were killed by drought.

The Winesap apple, Morello cherry and seedling peaches are in best condition. All decline in trees is due to neglect.

VINEYARDS.—Their present condition is very encouraging, as the wood growth has been good. Black rot has not yet developed on the grape.

The old Concord still holds the lead as the most successful variety.

SMALL FRUITS IN 1893.—The blackberry is the only class that has been successfully grown. A few strawberry plantations have been successful, but only where irrigation has been supplied.

CROPS OF FRUIT IN 1893.—Apples, light, quality fair; peaches, medium to heavy in favored localities, quality good; grapes, medium, quality good.

INSECTS were as prevalent in 1893 as in years preceding. Spraying for their destruction has not been tried.

## LABETTE COUNTY.—By D. DOYLE, OSWEGO.

**ORCHARDS.**—All classes of fruit trees are in good condition, excepting the peach and pear. Old trees of the former are declining, and blight has thinned heavily the plantations of the latter.

Varieties which are, at present, in best condition: Apple, Willow Twig, Missouri Pippin, Jonathan, Roman Stem, Lowell, Maiden's Blush, Dominie, Grimes's Golden; cherry, Early Richmond, English Morello; peach, Alexander, Morris White, and seedlings; the latter are the most hardy and productive; pear, Angouleme, Flemish Beauty, Bartlett; the first is the most hardy, but a shy bearer, the others are subject to attacks of blight, but most fruitful; plum, Miner, Wild Goose, Weaver.

Decline of apple trees has not yet been discovered. The oldest are in as good health as younger ones; cherry, most all varieties show the effect of age at from 14 to 17 years; peach, Early and Late Crawford begin to decline in health at 10 years. Stump the World at 14, Morris White at 15, and Heath Cling at nine years; pear trees blight at all ages; plum and quince, there is no sign of decline, even in the oldest trees.

Causes of decline: Apple trees, from sun scald and insects; cherry, are attacked in some of the branches by an unknown disease, which extends downward into the trunk and proves fatal to the parts attacked; peach, owing to extreme dry summer followed by extreme cold winter.

New varieties introduced and promising: September Beauty and Victory peach, both freestones; originated at Oswego. Draper's Missouri plum, a large, red fruit, ripening about three weeks later than the Wild Goose, and of the form of the Weaver.

Varieties rejected as unworthy of cultivation: Apple, the Winesap, owing to small size of its fruit; cherry, nearly all of the heart varieties; peach, Heath Cling.

**VINEYARDS.**—In 1892, their condition was not very good. Rot was prevalent on the fruit and drought caused a weak growth of the canes. In 1893, the condition was better, and rot was not prevalent.

Varieties most successfully grown: Concord and Dracut Amber.

**SMALL FRUITS IN 1893.**—The condition of plantations, blackberry and raspberry, poor; strawberry, very poor; currant and gooseberry, good.

The Kittatinny blackberry, all varieties of currants, Houghton gooseberry, Gregg raspberry, Bubaoh No. 5, Jessie and Gandy strawberry, for late. Strawberries are the most successful for profit and market.

**CROPS IN 1893.**—Of all classes of orchard fruits, very light, excepting pears, which were a medium crop, and in quality, good. The quality of all others was poor. None of the crop was first class, excepting that of the Early Richmond cherry, and nearly all varieties of pears.

Small fruits: Crops of grapes and currants, medium; light of all other classes. In quality, grapes, currants, and gooseberries, good; all others, poor. About one-half of the crop of grapes, blackberries, and strawberries, and all of the currants, gooseberries, and raspberries, were first-class, marketable fruit.

**INSECTS.**—The Codlin Moth, Apple and Plum Curculios and Plum Gouger were prevalent.

**Spraying:** Where this treatment has been practiced to check the ravages of insects, the result has been reported favorable. Very few culturists have tried spraying with fungicides, but, where practiced, blackberry and raspberry rust have been checked, and the results are encouraging.

## MONTGOMERY COUNTY.—By P. C. BOWEN, CHERRY VALE.

**ORCHARDS.**—The condition of the apple, plum and quince trees is generally good; cherry, worked on Morello or Mazzard stocks, good; peach, generally neglected, and damaged by borers; pear, owing to attacks of blight, poor.

Varieties in best condition: Apple, Ben Davis, Missouri Pippin, Jonathan, Maiden's Blush, Willow Twig, Wagener; cherry, Early Richmond, English Morello; peach, no perceptible difference in varieties; pear, same as the peach, all varieties suffer from blight; plum, Wild Goose leads; quince, Orange.

Of apples, the Fameuse, Golden Pippin, Lowell and Early Harvest begin to decline at from 8 to 12 years old, and some Ben Davis at from 15 to 20, evidently more from neglect than any other cause. 'T is true that blight, sun scald and drought have a damaging effect. Peach and plum trees are sometimes killed by a borer. The quince tree, when planted on good soil and well cared for, is healthy and a success. Cherry trees propagated on the Mahaleb stock fail young.

**VINEYARDS.**—The present condition of plantations of a bearing age is excellent.

Black rot in some vineyards has been very damaging. But it has been materially checked by spraying with Bordeaux mixture. The Concord, Moore's Early, Draout Amber and Isabella have been most successfully grown.

**SMALL FRUITS.**—Condition of plantations in spring of 1898: Blackberry, not good, damaged by rust; currant, very poor, excepting when grown in shade; gooseberry, good, where thoroughly cultivated and the ground well manured; raspberry, about normal; strawberry, excellent.

The Early Harvest, Erie, Stone's Hardy and Minnewaska blackberry have not suffered much from rust, and are the most desirable sorts; Red Dutch and Black Naples currants planted on the north side of buildings produce excellent crops of choice fruit; Houghton and Downing gooseberry; Tyler, Souhegan, McCormick, Kansas, Shaffer, Smith's Ironclad, Royal Church and Cuthbert raspberry; Captain Jack, Burbach No. 5, Charles Downing, Michel, Gandy, Cumberland, Glendale, Kentucky, Windsor Chief Crescent, Jessie, Mount Vernon, Monmouth and Parker Earle strawberries are all successfully grown.

The most profitable for market sorts: Blackberry, Early Harvest, Lucretia dewberry, Stone's Hardy; gooseberry, Downing; raspberry, Tyler, Shaffer; strawberry, Michel, Captain Jack, Gandy, Charles Downing, Glendale.

**CROPS IN 1898.**—Apples, light; quality, poor; cherries, early sorts, medium; late sorts, very light; quality, good; peaches, early varieties, good; late, very light, and in quality, poor; pears, fair crop; quality, poor; plums and quinces, good in quantity and quality.

There were no first-class apples or pears. Three-fourths of the crop of cherries, one-third of the peaches and four-fifths of the plums and quinces were first-class, marketable product.

Small fruits: Grapes, heavy; blackberries, very light; gooseberries, raspberries, strawberries, light crops.

In quality: Grapes, very good; blackberries, poor. All other classes fairly good, excepting strawberries, which were poor and knotty.

**INSECTS.**—These enemies of the fruit grower were more plenty than ever before; and, unless the laws make spraying compulsory, fruit growing in Kansas will be abandoned.

Spraying with insecticides and fungicides has been tried by only a very few. But, where thoroughly done, much good has resulted. Where applied to check blackberry rust, it has been quite effectual.

## NEOSHO COUNTY.—By C. W. HAYDEN, TRAYER.

**ORCHARDS.**—Condition of all classes of fruit, good. The season's wood growth was fair to very good, and well ripened for winter in well-cared-for orchards. In others, scab and borers were prevalent.

Of apple trees, the Missouri Pippin and Talman become exhausted in 8 or 10 years from first fruiting.

Many of the recently-planted apple and peach orchards contain some of the new varieties, but, not having fruited, their value cannot be determined.

Varieties fairly tried, and rejected as not satisfactory: Apple, Talman, Roman Stem, Milam, Rawle's Genet, Cooper's Early, Smith's Oider, Fall Wine, Bailey's Sweet, Fameuse; cherry, all sorts except Early Richmond, English Morello; plum, all except Wild Goose, Miner.

**VINEYARDS.**—Condition of bearing plantations was good in 1892 and 1893, and canes were well ripened. Black rot was prevalent in 1892. Vines treated with the Bordeaux mixture yielded 95 per cent. of a crop; those not treated lost 50 to 75 per cent. of their crop. The rot was not prevalent in 1893, especially in vineyards which were sprayed the season before. The Concord, Ives, Elvira and Dracut Amber are most successfully grown.

**SMALL FRUITS.**—Condition: Blackberry good, raspberry poor, strawberry very poor. The Early Harvest, Kittatinny, Lawton and Snyder blackberry, and Outhbert, Turner and McCormick raspberry, are the most successful varieties.

CROPS IN 1893 were very light of all orchard fruits excepting peaches, which was fair. In quality, apples, very poor; cherries, fair; peaches and plums, good.

Marketable product: Of apples, none; cherries, 50 per cent.; peaches and plums, 75 per cent. were No. 1.

Small fruits—crops: Blackberry, medium; raspberry, light; all others, a total failure. In quality, the blackberry was good; raspberry, poor. Grapes were a medium crop, and of good quality; 75 per cent. of the product was marketable.

**INSECTS.**—Owing to the almost entire failure of the apple crop, it is very difficult to determine the prevalence of insects as compared with preceding years. The usual percentage of what apples were grown were wormy. Plums sprayed were free from worms. The result of treating our orchards with fungicides, as Bordeaux mixture and Paris green, was beneficial. The foliage on treated trees was much more healthy than on untreated ones. A little lime water was used with the Paris green.

## PRATT COUNTY.—By H. H. CUMMINS, PRATT.

(*North half.*)

**ORCHARDS.**—All bearing trees are in good condition. Those set during the present year have been very much injured by borers. There is no perceptible difference in the condition of different varieties.

New fruits that are promising: Late Montmorency is the most desirable cherry. It has yielded full crops of fruit during the last three years, while other sorts have failed two years out of the three.

**VINEYARDS IN 1892-'93.**—Those of bearing age have been in good condition. The cane growth has been rather light, but well matured. Black rot of the fruit has not appeared in this locality.

The Hartford, Concord, Worden, Martha, Catawba and Agawam are most successful.

**SMALL FRUITS.**—All classes are in good condition, excepting the raspberry, which is poor.

The Kittatinny blackberry, Orandall currant, Houghton gooseberry, Gregg

raspberry, and Crescent, Charles Downing, Manchester and Captain Jack strawberry, succeeded the best.

**CROPS IN 1893.**—Orchard: Apple, quince, and pear, an entire failure; cherry (Montmorency), full; peach, light.

Small fruits: Grapes and currants, medium; strawberries, where irrigated, heavy; blackberries, gooseberries, and raspberries, light.

In quality, all were good, excepting the gooseberry, which was poor.

INSECTS were not prevalent; hence spraying was not used.

(*South half.—By C. A. Koehler, Coates.*)

**ORCHARDS.**—The condition of all classes of fruit trees is good, excepting the pear, which is poor.

In orchards which have been well cultivated, there is no tendency to a failure, excepting in a few localities where hailstorms have been severe.

**VINEYARDS.**—The present condition of plantations of bearing age is good. Black rot has not yet been found on the fruit. The cane growth the present season was fairly strong, and the yield of fruit good.

**SMALL FRUITS IN 1893.**—The present condition of the blackberry and gooseberry, good; currant and raspberry, poor; strawberry, fair.

**CROPS IN 1893.**—Of the apple and cherry, light; peach, fairly good. In quality, all were good, and about 90 per cent. first-class marketable fruit.

Of small fruits of all classes, light, excepting the gooseberry, which was a medium crop.

In quality, all classes were good. About 75 per cent. of the grape, 90 per cent. of the gooseberry and 50 per cent. of the strawberry crop was first-class marketable fruit.

Spraying with insecticides and fungicides has not been tried, so far as I am able to learn.

**SUMNER COUNTY.—By THOS. BASSLER, GEUDA SPRINGS.**

**ORCHARDS.**—Apple trees were defoliated by drought and neglect; peach, very much broken down by the heavy fruiting of other years and failure to treat them with "heading-in" process; pear trees suffered from blight, plum from neglect.

Varieties in best condition: Apple, Missouri Pippin, Fulton, Willow Twig, Maiden's Blush, Fall Wine, Dominie; cherry, Early Richmond; peach, all late-ripening varieties; plum, Wild Goose, German Prune.

The Rawle's Genet and White Winter Pearmain apple, and cherry trees, begin to decline when about 15 years old, owing to lack of proper cultivation and drought; peach, to overbearing and lack of pruning.

Varieties tried, and rejected as not satisfactory: Apple, Willow Twig, Rawle's Genet, and Dominie.

**VINEYARDS IN 1892.**—Where given proper cultivation, their condition was good. The cane growth was vigorous and well ripened up for winter. Black rot was prevalent on the fruit.

The condition in 1893 was about the same as in the preceding year. The Concord, Catawba and Niagara are the most successful varieties.

**SMALL FRUITS IN 1893.**—The condition of blackberry, gooseberry and strawberry plantations, good.

**CROPS IN 1893.**—Of all classes, light, excepting of peaches, which was fair. In quality, poor, excepting cherries and peaches, fair. There were no first-class apples, peaches, or plums. Cherries were about 50 per cent. first class.

Small fruits: Grapes, gooseberries, heavy; strawberries, light. In quality, all were poor.

INSECTS.—The Codlin Moth, Apple Curculio and Plum Curculio were prevalent. Spraying with insecticides was not practiced to check them.

WOODSON COUNTY.—By W. W. SMITH, LE ROY.

(North half.)

ORCHARDS.—The condition of all classes was good in 1893, excepting the pear and the quince, which was poor.

Varieties in best condition: Apple, Missouri Pippin, Ben Davis, Red Astrachan, Grimes's Golden, Fameuse, Smith's Cider, Dominie; cherry, Morellos, Early Richmond; peach, hardy Kansas seedlings; pear, about the same condition with all varieties, unless it be the Kieffer, which did not suffer so severely from blight; plum, improved native sorts.

All varieties of apples over 30 years old begin to decline, even in the best-treated orchards; cherry, at 20 years; peach, at 15 years old.

Cherry and plum trees fail because of hot, dry summers; peach, severe winters and borers; pear and quince, from attacks of blight.

Varieties of recent introduction that are promising: Apple, Gano, Arkansas Black, Mammoth Black Twig, Shannon (syn. Ohio Pippin), Shackelford, Loy, Brightwater, Coffelt Beauty; peach, Wonderful, General Lee; pear, Kieffer; plum, Kelsey.

Varieties tried and rejected: Apples, the Russian sorts, introduced by the United States department of agriculture in 1872, have proven worthless; cherry, all heart varieties; plum, all the European sorts.

VINEYARDS.—Condition of bearing vines in 1893, good. Black rot was not prevalent on the fruit. The Concord, Moore's Early, Pocklington, Champion, Elvira, Agawam and Goethe are most successfully grown. The Eaton is a promising new sort.

SMALL FRUITS.—The condition of all classes is good, excepting the raspberry canes, which are much damaged by rust.

Varieties most successfully grown: Blackberry, Kittatinny, Early Harvest, Taylor, Snyder; currant, Red Dutch; gooseberry, Houghton; raspberry, Gregg, Ohio, Souhegan, Turner; strawberry, Crescent, Captain Jack, Charles Downing, Glendale, Gandy.

CROPS IN 1893.—Orchards: Of all classes, very light, and in quality, poor.

Small fruits: The crop was light of all classes, but good in quality, excepting of the raspberry and strawberry, which was poor.

INSECTS were seemingly as prevalent as in preceding years. Very little spraying was done, and not enough to determine benefits.

# DEPARTMENT OF FINANCE.

## TREASURER'S REPORT.

STATEMENT of the receipts and disbursements for the years 1891, 1892, and 1893.

1891.		Dr.	Cr.
The appropriation for the fiscal year ending June 30, 1891, was as follows:			
Salary of Secretary.....		\$1,000 00	
Freight.....		35 00	
Expenses of members of the Board.....		100 00	
Travelling expenses of the Secretary.....		100 00	
Postage.....		300 00	
Expressage.....		400 00	
Disbursed:			
Salary of Secretary.....			\$1,000 00
Freight.....			35 00
Expenses of members of the Board.....			100 00
Travelling expenses of the Secretary.....			100 00
Postage.....			300 00
Expressage.....			400 00
Totals.....		\$1,935 00	\$1,935 00
1892.			
Receipts for the year ending June 30, 1892:			
Salary of Secretary.....		\$800 00	
Freight.....		35 00	
Expenses of members of the Board.....		100 00	
Travelling expenses of the Secretary.....		100 00	
Postage.....		200 00	
Disbursed:			
Salary of Secretary.....			\$800 00
Freight.....			35 00
Expenses of members of the Board.....			100 00
Travelling expenses of the Secretary.....			100 00
Postage.....			200 00
Totals.....		\$1,235 00	\$1,235 00
1893.			
Receipts for the year ending June 30, 1893:			
Salary of Secretary.....		\$800 00	
Freight.....		35 00	
Expenses of members of the Board.....		100 00	
Travelling expenses of the Secretary.....		100 00	
Postage.....		200 00	
Expressage.....		200 00	
Disbursed:			
Salary of Secretary.....			\$800 00
Freight.....			35 00
Expenses of members of the Board.....			100 00
Travelling expenses of the Secretary.....			100 00
Postage.....			200 00
Expressage.....			200 00
Totals.....		\$1,435 00	\$1,435 00

## SOCIETY'S SPECIAL FUND.

		Dr.	Cr.
1890.			
June 30....	Balance on hand.....	\$5 50	
1891.			
Jan. 21....	By bill of O. J. Farmer, Chicago, electros for vol. 18.....		\$6 00
Dec. 10....	To 17 annual membership fees.....	17 00	
" 20....	By expenses of Mrs. M. Newby attending annual meeting.....		4 25
	Totals.....	\$22 50	\$10 25
1892.			
June 30....	To balance.....	\$12 25	



**SOCIETY'S SPECIAL FUND—CONCLUDED.**

		<i>Dr.</i>	<i>Cr.</i>
1892.			
July 1....	Balance to new account.....	\$12 25	
Dec. 7....	By cost of telegrams to Missouri and Illinois Societies, greeting..		\$2 08
" 10....	To 15 annual membership fees.....	15 00	
" 10....	By bill of G. W. Bailey, member of the Board, expenses attending annual meeting.....		2 28
1893.			
Jan. —....	By Treasurer's office expense bill.....		10 00
" —....	By bill of H. A. Cutler, printing postal cards, envelopes, and programmes for annual meeting.....		15 75
	Totals.....	\$27 25	\$30 11
June 30....	Balance due Treasurer.....		\$2 86

Respectfully submitted.

F. HOLSINGER, *Treasurer.*

**SECRETARY'S FINANCIAL REPORT.**

	<i>Received.</i>	<i>Disbursed.</i>
<b>For the year ending June 30, 1891:</b>		
Secretary's salary.....	\$1,000 00	\$1,000 00
Freight on reports from state printer.....	35 00	29 55
Freight for shipping material, wrapping twine.....		1 80
Expenses of members of the Board.....	84 75	43 80
Traveling expenses of the Secretary.....	100 00	93 88
Postage on letters, circulars, and single copies of report.....	300 00	262 34
Postage paid for printing circulars, etc.....		13 75
Postage paid for telegrams.....		3 10
Expressage on packages of reports, etc.....	400 00	408 00
Balance due, as shown in account for 1890.....		80
Totals.....	\$1,869 75	\$1,871 62
Balance due Secretary July 1, 1891.....		\$1 87
<b>For the year ending June 30, 1892:</b>		
Secretary's salary.....	\$800 00	\$800 00
Freight and express charges on reports, etc.....	35 00	53 93
Traveling expenses of the Secretary.....	100 00	6 25
Postage on letters, circulars, and single copies of reports.....	200 00	266 22
Printing circulars, postal cards, etc.....		9 50
Telegram relating to annual meeting.....		40
Telegram to the Illinois Horticultural Society.....		71
Balance shown by statement for 1891.....		1 87
Totals.....	\$1,135 00	\$1,138 88
Balance due Secretary June 30, 1892.....		\$3 88
<b>For the year ending June 30, 1893:</b>		
Secretary's salary.....	\$800 00	\$800 00
Freight on reports and shipping material.....	35 00	35 10
Traveling expenses of the Secretary.....	100 00	104 64
Postage on letters, circulars, and single copies of reports.....	200 00	175 36
Expressage on packages of reports.....	200 00	193 15
Printing circulars, letter heads, etc.....		28 60
Balance shown by statement for 1892.....		3 88
Totals.....	\$1,835 00	\$1,835 73
Balance due Secretary June 30, 1893.....		\$0 73

**SOCIETY'S SPECIAL FUND.**

		<i>Received.</i>	<i>Disbursed.</i>
1891.	Received annual membership fees:		
Nov. 9....	U. B. Pearsall, Fort Scott.....	\$4 00	
" 9....	Geo. W. Combs, Fort Scott.....		
Dec. 21....	E. F. Walter, Wakefield.....		
Mar. 30....	Jno. B. Downman, Joplin, Mo.....		
	Disbursed:		
	Office rent.....		\$12 00
	Contingents, fuel, and lights, etc.....		11 66
	Life membership, in part:		
Oct. 3....	Prof. I. D. Graham, Agricultural College, Manhattan.....	2 50	
Dec. 21....	Thos. Arbothnot, Cuba.....	2 50	
	Totals.....	\$9 00	\$23 66
	Balance due Secretary.....		\$14 66

## SOCIETY'S SPECIAL FUND—CONCLUDED.

		<i>Received.</i>	<i>Disbursed.</i>
<b>1892.</b>	Received annual membership fees:		
<b>Jan. 7</b> .....	O. W. Jewell, Topeka.....	\$3 00	
<b>Mar. 12</b> .....	Asa Sleith, University Place, Neb.....		
<b>Dec. 10</b> .....	L. F. White, Beloit.....		
	Disbursed for office fuel and lights.....		\$7 00
	Totals.....	\$3 00	\$7 00
	Balance due Secretary.....		\$4 00
<b>1893.</b>	Received of Frank Worcester, Stafford, on life membership.....	\$2 50	
	Received of Dr. R. F. Kirkpatrick, Bartlesville, for annual membership.....	1 00	
	Disbursed for office fuel and lights.....		\$7 00
	Totals.....	\$3 50	\$7 00
	Balance due Secretary.....		\$3 50

Respectfully submitted.

G. C. BRACKETT, *Secretary.*

## STATISTICS.

[Furnished by the Secretary of the State Board of Agriculture.]

## ORCHARDS—1891.

TABLE showing the number of fruit trees in bearing.

COUNTIES.	Apple.	Pear.	Peach.	Plum.	Cherry.
Allen .....	96,760	1,198	49,581	11,394	17,749
Anderson .....	75,323	1,366	49,365	8,189	14,346
Atchison .....	132,803	1,173	22,821	2,894	11,600
Barber .....	4,742	418	80,938	3,221	2,194
Barton .....	13,871	1,567	14,639	8,834	9,802
Bourbon .....	150,376	3,327	30,126	9,888	20,765
Brown .....	173,553	1,349	60,661	5,055	28,428
Butler .....	121,635	3,194	269,196	26,364	40,895
Chase .....	34,155	1,644	36,223	3,607	10,025
Chautauqua .....	79,614	2,247	114,770	12,906	18,618
Cherokee .....	217,512	2,574	88,443	11,755	26,314
Cheyenne .....	65			2	48
Clark .....	378	114	2,685	169	179
Clay .....	67,371	1,008	45,535	8,097	20,364
Cloud .....	47,685	332	48,820	3,860	19,000
Coffey .....	123,969	2,381	61,925	11,754	20,206
Comanche .....	705	21	10,624	108	386
Cowley .....	107,678	5,310	411,466	24,884	39,545
Crawford .....	149,160	2,086	48,600	10,973	25,639
Decatur .....	1,202	13	2,282	1,861	896
Dickinson .....	87,340	2,726	125,082	18,538	32,499
Doniphan .....	141,611	1,087	25,716	3,318	6,913
Douglas .....	145,239	6,285	35,241	4,390	20,750
Edwards .....	769	55	5,264	1,944	876
Elk .....	70,562	1,826	123,877	28,345	21,146
Ellis .....	2,588	352	3,029	1,368	2,539
Ellsworth .....	8,784	147	9,974	4,213	5,431
Finney .....	3,402	36	4,468	4,551	296
Ford .....	578	66	7,177	5,104	1,756
Franklin .....	128,208	2,634	44,021	5,366	21,387
Garfield .....	152	12	740	82	48
Geary .....	31,227	1,510	21,930	1,498	11,767
Gove .....	9		10	227	38
Graham .....	85	8	74	474	214
Grant .....	212	8	408	15	266
Gray .....	213	29	658	567	213
Greeley .....					
Greenwood .....	78,027	1,850	112,120	8,285	18,895
Hamilton .....	130	3	919	189	56
Harper .....	22,997	697	253,489	5,927	8,164
Harvey .....	64,966	2,759	107,188	12,540	20,172
Haskell .....	200		180	205	
Hodgeman .....	135	1	1,286	727	171
Jackson .....	100,697	973	31,843	1,823	12,561
Jefferson .....	99,044	1,399	36,401	2,171	18,587
Jewell .....	61,354	1,062	90,239	15,737	27,804
Johnson .....	90,547	2,354	25,571	3,637	21,146
Kearny .....	276	76	224	258	185
Kingman .....	20,726	552	211,673	10,873	9,178
Kiowa .....	130	21	3,699	716	236
Labette .....	236,536	20,146	77,688	13,566	30,936
Lane .....	52		145	10,190	50
Leavenworth .....	187,737	3,245	24,694	1,979	11,394
Lincoln .....	9,172	461	11,564	3,071	4,427
Linn .....	99,087	1,839	31,940	2,906	14,682
Logan .....	26	1	138		38
Lyon .....	127,990	1,758	64,245	5,548	20,948
Marion .....	52,551	1,808	79,843	12,494	21,172
Marshall .....	98,635	842	27,730	3,264	15,341

ORCHARDS — 1891. Trees in bearing — continued.

COUNTIES.	Apple.	Pear.	Peach.	Plum.	Cherry.
McPherson.....	79,181	3,496	105,390	11,272	27,842
Meade.....	174	27	4,576	1,149	1,187
Miami.....	107,524	2,508	29,825	5,060	19,272
Mitchell.....	36,993	605	28,913	7,826	13,759
Montgomery.....	122,054	2,458	84,640	23,992	22,822
Morris.....	62,907	3,530	48,775	11,156	14,331
Morton.....	202	.....	118	.....	.....
Nemaha.....	116,636	740	29,044	2,776	13,981
Neosho.....	147,562	4,099	68,192	11,562	29,730
Ness.....	190	15	2,649	2,594	858
Norton.....	1,905	72	1,601	3,777	1,682
Osage.....	126,701	11,284	75,882	10,151	29,282
Osborne.....	11,747	773	8,091	967	3,568
Ottawa.....	39,186	615	39,051	7,482	16,904
Pawnee.....	3,218	244	2,368	12,913	2,641
Phillips.....	6,561	107	1,514	1,508	2,989
Pottawatomie.....	93,817	1,297	87,354	4,288	22,435
Pratt.....	4,847	104	58,415	16,274	3,586
Rawlins.....	205	2	93	2,063	302
Beno.....	63,085	4,684	258,627	50,422	24,220
Republic.....	74,941	796	66,520	8,065	25,371
Rice.....	33,865	936	77,987	11,082	20,668
Riley.....	69,082	837	84,762	2,245	13,548
Books.....	3,661	57	3,910	1,292	2,986
Rush.....	1,431	57	2,714	1,716	2,598
Russell.....	2,398	141	3,807	4,110	3,585
Saline.....	51,707	2,055	37,581	8,968	13,747
Scott.....	.....	.....	4	5	13
Sedgewick.....	124,650	5,120	262,175	21,551	39,881
Seward.....	.....	4	216	49	43
Shawnee.....	135,004	1,891	58,506	4,567	26,204
Sheridan.....	3	.....	12	91	113
Sherman.....	40	.....	15	152	41
Smith.....	18,171	197	23,638	5,854	9,510
Stafford.....	9,126	335	59,984	6,223	5,610
Stanton.....	.....	.....	.....	.....	4
Stevens.....	109	6	806	37	90
Sumner.....	124,110	4,587	568,366	15,236	47,077
Thomas.....	.....	.....	32	36	96
Trego.....	71	11	758	1,053	206
Wabawnee.....	75,969	1,261	42,310	2,529	14,547
Wallace.....	25	.....	.....	5	32
Washington.....	112,973	1,349	65,829	4,899	21,119
Wichita.....	5	5	6	108	73
Wilson.....	156,931	2,042	85,272	10,622	26,321
Woodson.....	74,663	1,159	49,120	5,837	21,142
Wyandotte.....	95,116	1,164	24,145	4,102	9,358
<b>Totals</b> .....	<b>5,758,907</b>	<b>150,531</b>	<b>5,395,700</b>	<b>663,838</b>	<b>1,263,867</b>
<b>1892.</b>					
Allen.....	91,685	1,065	38,007	7,725	14,857
Anderson.....	80,130	1,884	32,063	2,907	15,611
Atchison.....	117,560	1,185	21,057	1,969	10,388
Barber.....	8,290	405	88,293	2,174	2,407
Barton.....	15,406	1,162	21,906	4,476	12,098
Bourbon.....	173,732	4,285	38,508	12,164	22,658
Brown.....	163,708	1,840	57,166	9,967	16,867
Butler.....	151,056	8,069	194,185	24,946	46,548
Chase.....	39,750	1,539	29,093	4,299	11,050
Chautauqua.....	75,884	2,664	70,235	11,403	17,434
Cherokee.....	200,833	2,469	58,858	11,266	24,753
Cheyenne.....	122	.....	567	142	428
Clark.....	182	88	5,708	88	154
Clay.....	68,618	1,225	50,495	8,830	24,668
Cloud.....	60,203	597	57,051	2,916	25,117
Coffey.....	121,532	2,381	49,346	8,304	22,620
Comanche.....	1,072	120	15,509	250	624
Cowley.....	160,326	6,445	308,081	21,658	89,063
Crawford.....	148,976	2,297	32,201	8,154	20,264
Decatur.....	881	214	2,356	725	1,361
Dickinson.....	104,507	4,012	107,360	16,368	35,553
Doniphan.....	155,726	1,410	31,014	4,071	6,968
Douglas.....	163,121	9,460	35,170	5,965	24,322
Edwards.....	1,152	128	5,442	2,018	1,197
Elk.....	81,230	3,696	103,077	11,894	19,873
Ellis.....	3,805	154	5,237	7,834	4,862
Ellsworth.....	9,781	252	14,658	1,600	5,728
Finney.....	4,671	84	7,378	7,588	1,016
Ford.....	872	83	12,391	5,230	1,365

ORCHARDS — 1892. Trees in bearing — *concluded.*

COUNTIES.	Apple.	Pear.	Peach.	Plum.	Cherry.
Franklin.....	114,577	3,081	36,417	5,335	25,498
Garfield.....	212	9	880	69	31
Geary.....	36,105	1,372	18,579	2,145	12,446
Gove.....	2	2	161	360	74
Graham.....	377	5	1,288	885	547
Grant.....	340	6	2,213	768	72
Gray.....	1,501	24	2,587	618	384
Greeley.....	.....	.....	.....	11	5
Greenwood.....	93,038	1,820	29,254	10,175	17,100
Hamilton.....	641	241	1,042	142	245
Harper.....	32,938	1,574	237,538	18,947	11,439
Harvey.....	77,475	4,761	86,901	18,037	26,085
Haskell.....	265	10	2,404	1,146	64
Hodgeman.....	110	2	1,547	8,122	526
Jackson.....	109,853	1,005	33,347	3,533	13,375
Jefferson.....	108,084	2,279	42,976	8,434	21,510
Jewell.....	66,371	2,655	81,893	8,332	38,165
Johnson.....	92,151	2,885	28,916	4,332	16,921
Kearny.....	204	37	1,032	440	323
Kingman.....	26,258	587	165,306	19,265	10,064
Kiowa.....	333	61	7,390	268	449
Labette.....	200,842	4,522	54,774	12,640	25,581
Lane.....	125	2	887	205	10
Leavenworth.....	173,768	3,716	23,115	2,052	1,179
Lincoln.....	10,260	306	19,676	4,994	7,643
Linn.....	100,962	2,299	27,720	3,874	15,300
Logan.....	81	2	250	2,334	64
Lyon.....	131,637	1,680	55,662	8,238	19,685
Marion.....	68,253	3,091	88,905	15,837	29,962
Marshall.....	100,108	1,001	38,456	30,279	16,355
McPherson.....	104,815	3,898	103,458	13,827	34,747
Meade.....	623	14	6,040	550	496
Miami.....	88,165	2,614	31,115	3,250	12,537
Mitchell.....	49,499	1,029	52,167	6,322	19,575
Montgomery.....	146,942	3,072	55,473	15,858	27,305
Morris.....	68,970	1,521	44,578	9,034	14,606
Morton.....	38	2	997	92	121
Nemaha.....	129,373	1,104	36,142	4,239	17,587
Neosho.....	166,861	3,215	47,656	11,408	26,461
Ness.....	317	8	3,673	8,110	923
Norton.....	1,579	170	4,728	2,423	2,658
Osage.....	114,987	1,986	52,834	6,018	25,624
Osborne.....	16,090	374	13,773	13,993	6,780
Ottawa.....	44,468	800	51,572	6,867	19,481
Pawnee.....	4,014	263	4,557	10,914	3,366
Phillips.....	8,690	451	5,499	3,100	5,447
Pottawatomie.....	100,847	1,391	30,985	3,904	24,062
Pratt.....	5,221	1,002	68,993	8,590	5,081
Rawlins.....	186	6	368	3,462	298
Reno.....	85,243	4,774	246,479	12,536	18,302
Republic.....	92,064	1,613	83,908	7,696	23,452
Rice.....	35,260	1,891	71,793	13,678	22,940
Riley.....	86,372	1,132	90,794	6,868	14,921
Books.....	3,543	42	12,856	4,164	4,358
Rush.....	2,117	180	6,556	3,219	4,727
Russell.....	2,421	79	5,913	2,179	4,170
Saline.....	55,166	4,062	38,366	6,776	16,327
Scott.....	22	1	318	74	72
Sedgwick.....	147,503	6,964	186,942	19,190	38,188
Seward.....	2	18	1,440	114	155
Shawnee.....	161,244	1,844	51,312	4,663	27,325
Sheridan.....	71	5	167	54	94
Sherman.....	69	.....	34	2,110	373
Smith.....	19,747	251	29,867	80,084	13,071
Stafford.....	11,178	513	63,360	6,417	12,063
Stanton.....	9	1	859	247	58
Stevens.....	186	26	1,472	8	776
Sumner.....	146,445	6,156	474,606	16,804	54,796
Thomas.....	26	.....	36	577	240
Trego.....	360	36	1,558	4,649	892
Wabannsee.....	90,699	1,612	40,475	3,241	15,616
Wallace.....	20	.....	250	.....	11
Washington.....	125,134	1,783	49,687	5,619	24,800
Wichita.....	101	6	40	833	139
Wilson.....	121,803	2,519	50,417	10,285	23,674
Woodson.....	56,368	1,216	30,646	3,783	15,280
Wyandotte.....	89,197	886	17,998	4,346	8,982
Totals.....	6,119,609	158,472	4,715,020	741,443	1,344,177

# ORCHARDS—1891.

TABLE showing the number of fruit trees not in bearing.

COUNTIES.	Apple.	Pear.	Peach.	Plum.	Cherry.
Allen	75,980	2,104	4,666	2,073	3,891
Anderson	75,580	2,186	6,911	2,702	6,684
Atchison	91,610	1,574	6,590	2,131	4,063
Barber	30,864	1,340	80,879	2,269	4,453
Barton	32,721	2,067	10,519	5,090	11,964
Bourbon	84,029	3,308	4,383	5,095	5,622
Brown	52,928	2,573	8,612	5,351	4,879
Butler	145,478	7,668	28,210	7,245	12,902
Chase	49,258	2,652	9,588	1,896	5,736
Chautauqua	87,193	4,040	8,941	3,535	3,886
Cherokee	145,359	2,329	9,271	3,667	8,445
Cheyenne	5,112	54	3,928	2,811	803
Clark	1,675	64	6,627	485	296
Clay	55,174	2,300	11,141	2,770	6,368
Cloud	49,319	1,408	7,493	2,100	8,800
Coffey	93,683	2,584	9,921	3,607	7,507
Comanche	5,569	182	25,668	910	597
Cowley	129,359	12,268	28,963	9,269	12,763
Crawford	85,119	2,202	3,922	3,788	4,196
Decatur	12,169	298	3,416	4,012	1,910
Dickinson	107,126	11,975	18,092	5,519	10,391
Doniphan	17,070	1,518	4,540	2,077	2,717
Douglas	61,603	4,575	5,626	2,539	4,863
Edwards	10,654	1,091	5,769	1,682	2,075
Elk	79,203	6,482	13,727	8,388	6,050
Ellis	8,538	391	4,879	3,146	2,566
Ellsworth	13,671	575	3,960	2,213	7,214
Finney	12,194	397	4,691	4,222	2,098
Ford	7,262	274	19,024	5,577	2,229
Franklin	70,988	3,109	4,295	2,194	8,127
Garfield	661	7	709	441	156
Geary	24,929	1,351	2,448	900	3,259
Gove	1,624	56	4,464	3,734	261
Graham	4,634	99	6,786	2,329	1,096
Grant	2,726	85	15,280	989	277
Gray	11,906	85	11,749	1,679	526
Greeley	2,120	175	9,315	2,115	957
Greenwood	154,743	4,784	14,185	6,299	7,315
Hamilton	3,713	98	3,471	1,114	490
Harper	60,142	2,810	64,275	6,909	12,605
Harvey	53,272	5,913	7,959	6,018	6,611
Haskell	1,688	37	14,359	8,873	422
Hodgeman	2,280	41	6,660	1,999	1,178
Jackson	70,309	1,472	17,646	3,598	5,150
Jefferson	54,955	2,674	8,923	1,394	4,843
Jewell	82,227	2,088	33,554	7,606	16,574
Johnson	47,770	1,994	7,557	2,646	3,134
Kearny	7,828	697	3,549	1,373	894
Kingman	47,602	2,196	46,581	6,171	10,431
Kiowa	6,769	231	12,022	905	718
Labette	131,880	3,129	5,925	3,998	5,901
Lane	3,149	78	3,900	1,376	185
Leavenworth	118,810	3,011	5,210	1,778	2,547
Lincoln	25,906	988	10,514	3,197	5,724
Linn	60,800	2,672	9,484	1,549	4,890
Logan	2,653	60	4,409	2,881	530
Lyon	86,931	2,315	12,562	4,568	7,582
Marion	104,518	7,759	17,983	6,740	14,394
Marshall	96,882	1,846	9,631	2,580	4,910
McPherson	78,968	5,027	8,500	4,935	8,079
Meade	3,180	157	10,030	2,230	691
Miami	40,130	2,775	5,210	2,590	3,546
Mitchell	54,277	1,188	8,495	3,882	6,008
Montgomery	98,640	3,430	15,281	4,881	8,394
Morris	70,585	1,987	6,133	1,999	5,095
Morton	2,022	77	8,640	600	323
Nemaha	95,994	2,584	10,954	4,084	5,628
Neosho	99,216	2,994	6,044	4,080	4,990
Ness	5,828	206	6,820	3,067	1,231
Norton	20,351	192	7,778	810	3,066
Osage	166,638	3,960	11,888	4,892	11,396
Osborne	22,835	652	8,790	694	3,008
Ottawa	45,492	1,725	11,190	2,347	6,574
Pawnee	13,646	808	6,624	3,087	4,344
Phillips	21,886	474	3,079	1,588	4,427
Pottawatomie	72,053	1,979	10,702	2,148	6,339
Pratt	35,623	1,499	46,630	6,241	9,834
Rawlins	6,041	335	1,793	855	510

ORCHARDS—1891. Trees not in bearing—continued.

COUNTIES.	Apple.	Pear.	Peach.	Plum.	Cherry.
Reno .....	126,674	9,637	41,906	39,719	19,506
Republic .....	151,115	2,781	16,020	4,538	10,249
Rice .....	62,764	4,444	13,766	4,922	19,938
Riley .....	70,411	1,805	9,320	2,669	4,484
Rooks .....	9,203	101	6,914	556	2,714
Rush .....	15,143	369	6,732	6,326	5,062
Russell .....	8,962	661	4,621	2,564	3,593
Salline .....	51,982	2,154	7,451	2,159	5,028
Scott .....	1,142	109	3,080	631	468
Sedgwick .....	139,980	11,680	20,260	8,595	11,899
Seward .....	2,299	127	7,223	1,192	324
Shawnee .....	139,971	2,966	8,092	3,807	10,319
Sheridan .....	2,724	85	1,872	874	709
Sherman .....	4,521	139	3,298	7,792	1,156
Smith .....	49,188	378	14,424	2,273	9,810
Stafford .....	26,686	1,282	23,053	6,294	9,918
Stanton .....	1,689	46	11,228	3,599	311
Stevens .....	4,263	211	16,261	6,564	937
Sumner .....	136,003	11,788	67,064	8,966	28,272
Thomas .....	2,679	77	1,439	7,230	537
Trego .....	3,828	97	2,886	2,130	1,157
Wabaunsee .....	90,290	2,629	10,521	2,033	7,160
Wallace .....	2,291	234	1,955	905	390
Washington .....	174,516	3,236	15,665	2,914	9,638
Wichita .....	2,306	88	7,223	1,255	700
Wilson .....	115,440	4,697	7,797	4,544	5,182
Woodson .....	54,515	1,682	4,851	3,341	6,324
Wyandotte .....	52,670	1,509	3,427	3,333	5,221
<b>Totals .....</b>	<b>5,478,284</b>	<b>229,152</b>	<b>1,255,087</b>	<b>400,806</b>	<b>562,317</b>
<b>1892.</b>					
Allen .....	77,776	1,959	5,617	2,354	3,778
Anderson .....	61,526	2,090	7,658	2,606	6,252
Atchison .....	80,930	2,028	5,234	1,343	3,798
Barber .....	41,399	1,931	67,315	3,859	6,427
Barton .....	33,407	2,169	11,400	4,869	16,555
Bourbon .....	83,098	1,954	4,812	3,824	4,999
Brown .....	48,459	2,766	9,879	3,726	6,370
Butler .....	124,874	5,546	18,582	5,729	10,246
Chase .....	43,359	2,264	11,293	1,871	6,079
Chautauqua .....	80,617	2,747	6,060	2,347	2,975
Cherokee .....	126,721	1,961	8,761	3,920	7,705
Cheyenne .....	5,077	139	3,845	1,634	615
Clark .....	2,436	90	13,667	429	701
Clay .....	62,578	2,193	9,446	1,662	5,799
Cloud .....	53,486	1,379	5,692	2,968	6,207
Coffey .....	90,974	2,927	12,138	4,628	7,830
Comanche .....	6,633	280	26,849	871	881
Cowley .....	114,248	10,287	20,686	6,848	9,929
Crawford .....	79,547	2,085	3,974	3,086	4,010
Decatur .....	14,516	138	3,943	1,623	1,896
Dickinson .....	99,269	11,380	16,926	4,853	9,642
Doniphan .....	97,860	1,451	12,222	2,479	3,790
Douglas .....	69,229	5,431	7,434	3,217	4,162
Edwards .....	9,159	1,040	16,081	2,467	2,326
Elk .....	80,932	4,248	10,187	4,174	5,964
Ellis .....	8,536	145	7,007	2,153	5,610
Ellsworth .....	18,898	802	8,670	2,012	8,296
Finney .....	14,044	685	4,830	6,565	1,914
Ford .....	8,142	446	27,970	11,120	3,764
Franklin .....	61,088	2,656	5,988	2,827	5,146
Garfield .....	415	5	1,711	489	276
Geary .....	28,476	1,756	2,918	1,403	3,860
Gove .....	1,278	28	7,471	3,155	228
Graham .....	4,169	198	4,847	1,433	2,452
Grant .....	1,804	71	16,027	2,219	228
Gray .....	3,676	112	14,287	4,103	1,051
Greeley .....	1,209	53	12,324	5,985	837
Greenwood .....	117,891	4,365	42,167	5,400	8,744
Hamilton .....	6,850	199	13,213	2,337	675
Harper .....	86,256	3,529	53,864	6,064	17,222
Harvey .....	42,185	4,149	8,301	3,424	5,128
Haskell .....	1,106	34	11,988	4,744	457
Hodgeman .....	2,064	36	6,028	2,320	1,504
Jackson .....	72,320	1,849	9,096	2,475	4,543
Jefferson .....	77,562	2,465	9,867	1,922	4,691
Jewell .....	83,526	1,797	32,692	3,277	15,706
Johnson .....	55,896	3,763	7,974	2,291	3,563
Kearny .....	12,286	871	10,312	1,591	849

## ORCHARDS—1892. Trees not in bearing—concluded.

COUNTIES.	Apple.	Pear.	Peach.	Plum.	Cherry.
Kingman	63,333	4,333	50,079	8,918	12,847
Kiowa	11,381	482	30,244	1,688	1,074
Labette	141,338	1,901	4,341	2,469	4,694
Lane	1,172	55	2,491	579	191
Leavenworth	138,175	3,378	3,952	1,562	2,713
Lincoln	30,821	808	19,355	6,195	7,021
Linn	59,454	2,265	15,184	1,450	7,488
Logan	2,288	39	10,542	5,137	582
Lyon	93,733	2,089	14,292	4,261	6,447
Marion	94,504	7,572	18,461	4,585	10,492
Marshall	105,422	1,871	11,266	2,691	5,378
McPherson	80,470	4,481	11,074	3,967	8,899
Meade	2,785	205	19,441	2,399	1,187
Miami	40,715	2,567	6,360	1,899	3,355
Mitchell	52,451	1,603	9,219	2,443	6,370
Montgomery	80,965	2,624	6,696	3,082	4,447
Morris	81,795	3,851	11,023	2,146	6,050
Morton	1,371	119	10,063	717	242
Nemaha	88,825	2,862	13,250	4,718	7,288
Neosho	82,325	2,205	4,030	2,780	4,616
Ness	4,535	104	10,940	13,659	2,307
Norton	17,818	168	5,160	4,054	3,019
Osage	145,655	3,202	11,080	3,601	6,710
Osburne	31,955	1,504	13,894	2,892	5,546
Ottawa	45,098	2,160	6,783	2,829	8,377
Pawnee	13,209	1,115	6,179	7,729	5,995
Phillips	20,975	521	3,475	1,951	4,494
Pottawatomie	79,991	2,312	12,477	2,608	7,124
Pratt	44,081	1,667	74,000	7,334	9,993
Rawlins	4,153	95	3,405	2,110	584
Beno	312,730	11,036	55,400	34,535	32,258
Republic	127,152	2,868	13,017	2,771	8,917
Rice	65,927	6,681	15,808	6,843	22,560
Riley	72,651	2,234	10,850	1,649	5,387
Rooks	10,598	248	7,420	1,044	5,307
Rush	7,316	201	4,051	4,479	8,954
Russell	11,641	504	5,857	3,714	4,795
Saline	64,178	9,273	4,702	2,197	5,554
Scott	1,257	127	8,089	652	390
Sedgwick	114,636	8,995	21,521	6,064	9,472
Seward	2,037	84	7,821	1,226	1,041
Shawnee	152,305	2,744	11,567	4,322	8,422
Sheridan	1,584	23	2,099	571	791
Sherman	5,925	73	6,691	5,364	1,182
Smith	43,231	374	19,638	2,154	9,974
Stafford	29,624	1,400	27,402	6,716	15,595
Stanton	2,891	95	100,379	1,521	944
Stevens	3,227	102	16,358	6,090	550
Sumner	123,664	11,216	42,792	8,467	22,503
Thomas	4,867	7	4,628	2,522	1,127
Trego	9,888	176	4,916	3,760	1,320
Wabunsee	51,397	2,505	11,868	1,802	6,104
Wallace	1,973	32	10,258	1,837	241
Washington	171,867	2,954	21,179	3,242	10,355
Wichita	1,553	65	7,170	1,252	546
Wilson	103,271	3,107	7,107	4,701	19,385
Woodson	42,630	1,340	4,987	2,198	4,673
Wyandotte	52,341	1,485	8,724	5,258	6,518
Totals	5,581,653	227,562	1,521,528	390,901	606,114



## NURSERIES, SMALL FRUITS, AND VINEYARDS—1891.

TABLE showing the number of acres planted.

COUNTIES.	Nurseries.	Raspberries.	Blackberries.	Strawberries.	Vineyards.
Allen	17	22	47	13	44
Anderson	5	35	33	21	56
Atchison	2	75	42	77	336
Barber	60	31	12	5	13
Barton	55	14	12	2	30
Bourbon	17	61	92	31	53
Brown	15	101	82	39	113
Butler	53	25	64	14	106
Chase	5	9	12	8	50
Chautauqua	85	13	45	22	59
Cherokee	7	90	264	274	61
Cheyenne	4	1	1		9
Clark		1	3		2
Clay	10	29	27	41	97
Cloud	1	4	11	10	28
Coffey	2	31	51	18	68
Comanche	2	1	9		7
Cowley	30	43	319	213	161
Crawford	54	49	75	42	77
Decatur	5	1	1	1	1
Dickinson	15	52	33	31	187
Doniphan	403	153	141	40	567
Douglas	186	163	106	157	162
Edwards	10	2			2
Elk	35	32	76	27	61
Ellis	23	7	12		10
Ellsworth	10	5	5	2	25
Finney	5	9	4	2	8
Ford	21		5	1	19
Franklin	44	43	35	41	44
Garfield					
Geary	25	9	21	15	77
Gove				1	2
Graham		2		1	2
Grant		1	1		
Gray			1		4
Greeley	5				
Greenwood	70	26	57	14	72
Hamilton					4
Harper	1	6	32	1	52
Harvey	35	8	75	10	111
Haskell		2	2	1	1
Hodgeman					
Jackson	1	28	27	32	65
Jefferson		40	37	59	62
Jewell	17	10	9	5	42
Johnson	155	77	46	48	167
Kearny	9	3	2		2
Kingman	18	10	36	4	66
Kiowa	2	2	5		1
Labette	21	22	60	29	35
Lane					
Leavenworth		175	155	194	221
Lincoln	11	3	3		29
Linn		40	100	35	21
Logan					
Lyon	84	42	26	25	106
Marion	324	11	12	5	230
Marshall	323	55	62	17	79
McPherson	3	46	98	31	271
Meade		1			2
Miami		18	57	27	39
Mitchell	35	4	3	5	24
Montgomery	29	18	94	49	55
Morris	7	15	6	11	24
Morton	10		1		
Nemaha	222	35	30	16	89
Neosho	36	29	88	10	69
Ness		4	1		5
Norton	6	1			1
Osage	2	86	144	60	118
Osborne		1			6

NURSERIES, SMALL FRUITS, AND VINEYARDS—1891. Acres planted—*continued.*

COUNTIES.	Nurseries.	Raspberries.	Blackberries.	Strawberries.	Vineyards.
Ottawa.....	183	8	31	8	19
Pawnee.....	10	10	13	3	20
Phillips.....	16	10	11	1	4
Pottawatomie.....	217	16	20	16	210
Pratt.....	5	9	26	6	18
Rawlins.....	1	1			
Reno.....	20	49	204	10	240
Republic.....	19	17	17	13	56
Rice.....		11	32		72
Riley.....		14	10	9	75
Rooks.....	3	7	2	3	2
Rush.....	1	1			
Russell.....		1			2
Saline.....	36	13	30	19	348
Scott.....					
Sedgwick.....	63	79	167	38	437
Seward.....					
Shawnee.....	727	143	129	87	210
Sheridan.....	3	1		5	
Sherman.....	1	1			1
Smith.....		101	1		8
Stafford.....	24	7	13		15
Stanton.....	1	1	1	1	2
Stevens.....					
Sumner.....	173	29	151	20	154
Thomas.....					
Trego.....		1		1	1
Wabasha.....		15	22	13	88
Wallace.....	2	1	1		
Washington.....	336	37	29	24	88
Wichita.....		2	1		
Wilson.....		37	93	18	40
Woodson.....	17	6	25	9	14
Wyandotte.....	15	455	175	144	297
Totals.....	4,991	3,015	4,140	2,286	7,085
1892.					
Allen.....	21	19	56	12	49
Anderson.....	14	74	47	11	46
Atchison.....	10	68	40	52	196
Barber.....	47	6	11	3	26
Barton.....	14	1	6	13	47
Bourbon.....	53	60	88	40	41
Brown.....		66	78	38	99
Butler.....	156	51	67	17	82
Chase.....		23	20	31	59
Chautauqua.....	8	11	44	10	49
Cherokee.....	10	55	94	260	28
Cheyenne.....				1	3
Clark.....				2	3
Clay.....	17	29	20	47	131
Cloud.....	2	1	7		15
Coffey.....	15	19	37	11	39
Comanche.....		1	2	3	3
Cowley.....	43	42	319	78	165
Crawford.....	86	105	137	108	46
Decatur.....	8	1	1	1	2
Dickinson.....	141	32	37	46	164
Doniphan.....		86	168	69	438
Douglas.....	209	225	127	128	155
Edwards.....	21	1	1	2	
Elk.....	70	26	64	21	53
Ellis.....	48	258	5	12	13
Ellsworth.....	21	3	2	4	13
Finney.....		7	10	8	10
Ford.....	11	1	5		15
Franklin.....	91	23	42	36	54
Garfield.....					2
Geary.....	35	5	8	6	91
Gove.....					3
Graham.....					1
Grant.....		3	2		1
Gray.....	1	1		2	
Greeley.....	1				2
Greenwood.....	4	16	50	5	73
Hamilton.....	1	1	1	52	5
Harper.....	10	3	48	5	66
Harvey.....	74	23	51	9	94

NURSERIES, SMALL FRUITS, AND VINEYARDS—1892. Acres planted—concluded.

COUNTIES.	Nurseries.	Raspberries.	Blackberries.	Strawberries.	Vineyards.
Haskell.....		1		1	1
Hodgeman.....		5	5		1
Jackson.....	108	36	32	19	57
Jefferson.....		72	57	58	68
Jewell.....	37	5	3	4	15
Johnson.....	95	60	33	26	147
Kearny.....	9	1	1		
Kingman.....	13	17	62	10	77
Kiowa.....	2	1	7	1	6
Labette.....		20	47	51	118
Lane.....					
Leavenworth.....	2	116	75	108	123
Lincoln.....	5		2	3	40
Linn.....	85	32	98	23	6
Logan.....	150		3	1	
Lyon.....	6	29	22	19	125
Marion.....	54	47	31	7	263
Marshall.....	281	43	48	15	266
McPherson.....		37	86	28	282
Meade.....	2				5
Miami.....		20	23	8	35
Mitchell.....	4	8	4	4	21
Montgomery.....	2	23	104	38	68
Morris.....	3	13	10	9	33
Morton.....	5				
Nemaha.....	200	34	24	9	113
Neosho.....	85	21	65	37	80
Ness.....					1
Norton.....	5	12			
Osage.....	317	57	122	56	123
Osborne.....	76	22	28	12	68
Ottawa.....	193	11	41	8	20
Pawnee.....		6	6	8	6
Phillips.....	1	1	1	1	3
Pottawatomie.....	15	13	24	20	140
Pratt.....	26	3	9	7	15
Rawlins.....	19			2	3
Reno.....	37	69	180	34	300
Republic.....	15	14	21	19	63
Rice.....		6	107	1	54
Riley.....	9	25	21	17	109
Rooks.....	14		1		1
Rush.....	73	3	50	2	7
Russell.....					
Saline.....	46	40	45	54	350
Scott.....					7
Sedgwick.....	80	48	153	37	370
Seward.....		20			1
Shawnee.....	629	337	106	78	187
Sheridan.....		1			1
Sherman.....					
Smith.....	5	14	1	1	3
Stafford.....	12	8	75	310	120
Stanton.....		1	11	15	8
Stevens.....		189	43		2
Sumner.....	100	60	123	25	115
Thomas.....					12
Trego.....		2		2	6
Wabaunsee.....	7	19	18	12	109
Wallace.....					
Washington.....	41	29	26	32	153
Wichita.....	7		1	1	2
Wilson.....		4	76	20	38
Woodson.....	12	7	16	13	9
Wyandotte.....	18	436	171	146	355
Totals.....	4,150	3,451	3,992	2,555	7,091

## ARTIFICIAL FORESTS—1891.

TABLE showing number of trees one year old and over.

COUNTIES.	Walnut.	Maple.	Honey locust.	Cotton-wood.	Other varieties.
Allen.....	53	174	.....	18	448
Anderson.....	145	70	.....	8	1,392
Atchison.....	147	164	18	125	5,800
Barber.....	30	13	9	104	609
Barton.....	171	28	71	683	694
Bourbon.....	6	17	.....	.....	18
Brown.....	240	188	37	491	4,612
Butler.....	122	52	17	385	2,017
Chase.....	50	5	9	58	102
Chautauqua.....	25	28	2	17	3,822
Cherokee.....	9	155	2	.....	2,117
Cheyenne.....	44	10	2	163	426
Clark.....	327	161	211	92	110
Clay.....	139	346	5	1,024	1,529
Cloud.....	80	24	2	988	1,133
Coffey.....	25	31	1	2	1,662
Comanche.....	40	1	10	189	64
Cowley.....	84	115	4	289	1,289
Crawford.....	20	106	5	1	1,124
Decatur.....	56	13	6	135	1,229
Dickinson.....	242	162	11	351	1,102
Doniphan.....	236	156	32	312	6,295
Douglas.....	19	38	3	1	1,627
Edwards.....	32	49	63	799	249
Ellis.....	32	199	1	70	90
Ellsworth.....	5,710	25	4,373	1,475	418
Finney.....	99	55	102	200	1,606
Ford.....	4	5	17	153	163
Franklin.....	56	3	219	336	486
Garfield.....	42	141	9	304	4,788
Geary.....	20	.....	1	69	11
Gove.....	35	59	4	82	975
Graham.....	12	20	30	41	136
Grant.....	192	18	54	190	920
Gray.....	1	.....	.....	105	71
Greeley.....	13	2	7	323	82
Greenwood.....	27	.....	22	13	78
Hamilton.....	37	535	4	118	1,611
Harper.....	.....	.....	.....	362	32
Harvey.....	57	66	15	780	452
Haskell.....	88	101	7	1,138	655
Hodgeman.....	114	3	514	373	560
Jackson.....	62	11	107	26	294
Jefferson.....	68	194	1	93	8,975
Jewell.....	74	75	4	14	168
Johnson.....	106	67	35	817	2,144
Kearny.....	122	98	7	4	2,969
Kingman.....	.....	5	28	107	18
Kiowa.....	48	46	20	1,112	458
Labette.....	3	25	.....	523	52
Lane.....	54	147	3	21	1,029
Leavenworth.....	5	.....	15	24	101
Lincoln.....	102	47	11	10	8,322
Linn.....	56	3	27	238	709
Logan.....	172	40	.....	.....	2,393
Lyon.....	4	1	.....	18	131
Marion.....	12	7	5	33	43
Marshall.....	258	41	185	766	660
McPherson.....	49	205	7	346	313
Meade.....	271	70	32	1,585	1,939
Miami.....	49	11	37	604	350
Mitchell.....	37	87	3	20	378
Montgomery.....	208	15	49	609	2,482
Morris.....	16	70	1	10	3,466
Morton.....	50	23	.....	80	1,372
Nemaha.....	2	1	13	362	20
Neosho.....	64	197	5	172	2,018
Ness.....	71	142	1	39	313
Norton.....	300	65	155	288	269
Osage.....	228	206	339	203	1,132
Osborne.....	77	65	80	20	88
.....	257	15	90	270	804

## ARTIFICIAL FORESTS—1891. Trees one year old and over—continued.

COUNTIES.	Walnut.	Maple.	Honey locust.	Cotton-wood.	Other varieties.
Ottawa.....	105	58	3	643	690
Pawnee.....	66	5	11	296	47
Phillips.....	237	20	26	240	966
Pottawatomie.....	52	133	1	91	112
Pratt.....	125	212	407	825	291
Rawlins.....	76	19	24	77	1,478
Beno.....	383	116	91	4,064	1,849
Republic.....	236	183	21	969	2,646
Rice.....	123	64	747	868	1,006
Riley.....	67	69	1	71	385
Books.....	243	10	78	247	735
Rush.....	65	9	68	88	479
Russell.....	120	15	70	48	324
Saltine.....	198	264	17	929	1,446
Scott.....	21	2	2	63	16
Sedgwick.....	239	113	12	2,293	1,322
Seward.....	6	7	20	62	23
Shawnee.....	15	20	4	27	1,520
Sheridan.....	34	4	1	37	648
Sherman.....	9	2	.....	45	541
Smith.....	433	35	13	402	1,178
Stafford.....	116	34	30	2,079	791
Stanton.....	2	1	9	101	64
Stevens.....	23	11	4	265	109
Sumner.....	261	127	45	1,888	966
Thomas.....	68	5	9	489	849
Trego.....	20	2	94	97	584
Wabauauee.....	249	37	1	63	165
Wallace.....	13	1	4	34	69
Washington.....	55	228	10	652	4,438
Wichita.....	14	.....	18	34	34
Wilson.....	100	113	.....	5	1,351
Woodson.....	12	117	.....	10	66
Wyandotte.....	.....	4	.....	.....	2,274
Totals.....	15,482	7,334	8,988	38,930	125,261
1892.					
Allen.....	95	171	1	22	715
Anderson.....	39	56	.....	2	1,504
Atchison.....	40	191	2	72	4,398
Barber.....	33	220	10	406	806
Barton.....	132	135	194	836	461
Bourbon.....	19	24	.....	2	6
Brown.....	136	321	47	454	4,725
Butler.....	96	47	25	277	1,685
Chase.....	50	13	10	49	162
Chautauqua.....	69	46	2	11	20
Cherokee.....	14	78	1	6	4,019
Cheyenne.....	69	4	14	164	868
Clark.....	2	13	14	75	22
Clay.....	130	286	2	773	1,474
Cloud.....	79	77	42	670	1,279
Coffey.....	22	94	5	13	1,364
Comanche.....	62	15	4	235	335
Cowley.....	110	123	4	299	497
Crawford.....	9	37	4	6	1,291
Decatur.....	52	48	27	223	989
Dickinson.....	148	148	10	365	1,650
Doniphan.....	99	132	15	247	4,813
Douglas.....	54	78	5	7	2,691
Edwards.....	57	18	39	620	344
Elk.....	34	97	2	44	317
Ellis.....	87	13	193	223	272
Ellsworth.....	60	34	1,259	328	661
Finney.....	12	18	9	233	84
Ford.....	24	12	266	196	570
Franklin.....	42	54	1	10	5,612
Garfield.....	13	1	2	47	12
Geary.....	47	20	10	60	679
Gove.....	3	5	80	27	315
Graham.....	99	3	25	181	753
Grant.....	5	2	5	44	22
Gray.....	11	4	12	321	100
Greeley.....	27	2	28	9	19
Greenwood.....	37	108	1	34	1,971
Hamilton.....	1	.....	.....	86	32
Harper.....	82	126	67	830	463
Harvey.....	108	74	11	1,029	941

## ARTIFICIAL FORESTS—1892. Trees one year old and over—concluded.

COUNTIES.	Walnut.	Maple.	Honey locust.	Cotton-wood.	Other varieties.
Haskell.....	11	2	13	192	30
Hodgeman.....	42	2	161	18	386
Jackson.....	70	85	.....	21	4,869
Jefferson.....	291	106	3	16	501
Jewell.....	92	48	6	448	2,045
Johnson.....	194	112	.....	9	3,834
Kearny.....	4	.....	34	125	46
Kingman.....	26	39	41	1,062	422
Kiowa.....	330	41	109	1,847	741
Labette.....	35	162	11	23	2,924
Lane.....	12	6	11	30	119
Leavenworth.....	260	19	1	12	10,394
Lincoln.....	81	3	45	277	856
Linn.....	12	164	2	6	72
Logan.....	16	.....	23	37	268
Lyon.....	48	18	.....	27	52
Marion.....	118	52	11	498	1,124
Marshall.....	28	213	.....	442	1,152
McPherson.....	271	151	.....	1,619	1,893
Meade.....	59	13	65	632	2,777
Miami.....	26	15	.....	.....	2,241
Mitchell.....	725	28	44	547	1,684
Montgomery.....	35	103	10	42	3,593
Morris.....	62	55	.....	92	717
Morton.....	9	6	16	115	40
Nemaha.....	106	120	14	161	3,032
Neosho.....	26	98	.....	11	87
Ness.....	148	.....	55	74	563
Norton.....	119	8	35	140	4,014
Osage.....	115	93	10	24	79
Osborne.....	837	57	727	288	583
Ottawa.....	79	35	6	436	670
Pawnee.....	125	10	16	275	483
Phillips.....	249	33	20	374	1,046
Pottawatomie.....	37	105	1	78	207
Pratt.....	169	47	18	536	313
Rawlins.....	71	14	29	54	2,045
Reno.....	522	172	136	3,272	2,088
Republic.....	84	175	17	765	2,724
Rice.....	96	45	16	921	1,108
Riley.....	66	105	1	120	209
Rooks.....	248	23	96	288	858
Rush.....	74	4	72	40	376
Russell.....	88	7	40	32	339
Saline.....	193	324	31	1,537	1,756
Scott.....	14	2	8	58	52
Sedgwick.....	204	121	10	1,936	998
Seward.....	11	5	7	81	74
Shawnee.....	21	18	5	9	313
Sheridan.....	27	.....	12	42	419
Sherman.....	.....	.....	18	35	117
Smith.....	351	45	45	292	1,545
Stafford.....	123	33	11	1,622	432
Stanton.....	21	6	76	200	159
Stevens.....	5	9	3	211	218
Sumner.....	187	133	58	1,466	1,518
Thomas.....	70	7	32	628	895
Trego.....	12	4	74	69	390
Wabaunsee.....	46	125	4	75	1,373
Wallace.....	.....	.....	1	10	46
Washington.....	51	192	2	357	2,328
Wichita.....	2	3	16	63	88
Wilson.....	43	168	.....	23	1,232
Woodson.....	6	72	.....	10	510
Wyandotte.....	.....	4	.....	.....	3,947
Totals.....	9,801	6,803	4,776	34,280	128,723

NOTE.—It will be observed that some varieties are given a higher position in the several lists than others which have a greater aggregate vote, and which are seemingly entitled to a higher grade. But a close examination will show that the vote is to place them in the relative position in the list which they occupy. For instance: In the summer list, the Early Harvest apple is placed No. 1, because it has received the greatest vote for the position; the Carolina June is placed No. 2, having the greatest vote for that position; and so with each variety through the list.—SECRETARY.

FAMILY ORCHARD.— Varieties are arranged in the order of having the greatest number of votes for the place designated.		SUMMER APPLES.														Total.						
		Aitchison	Cloud	Clay	Dickinson	Davis	Jefferson	Jackson	Jewell	Lincoln	Nemaha	Osborne	Ottawa	Phillips	Pottawatomie		Riley	Republic	Shawnee	Saline	Wyanotte	Washington
1	Early Harvest	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	30
2	Carolina June	5	12	2	4	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	24
3	Red Astrachan	2	4	3	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	24
4	Cooper's White	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	31
5	Oldenburg	3	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	26
Scattering votes.																						
6	Early Pennock	...	...	...	...	...	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	Summer Rose	...	...	...	...	...	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	Early Joe	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	Autumn Bough	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	American Summer	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	Hightop Sweet	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	4	...	...	...
12	Benoni	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	4	...	...
13	Tetofsky	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	...	...	...	...	...	...
14	Keswick Codlin	...	...	...	...	...	...	...	...	...	...	...	...	...	5	...	3	...	...	...	...	...
15	Chenango	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...

[illegible]

**VOTED FRUIT LIST.**

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**NORTHERN FRUIT DISTRICT—CONTINUED.**

### WINTER APPLES.

[illegible]

## MARKET ORCHARD.

## SUMMER APPLES.

[illegible]

## AUTUMN APPLES.

1 Maiden's Blush.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	81
2 Rambo.....	3	2	2	4	2	2	3	...	5	3	3	2	5	3	2	3	3	3	2	29
3 Lowell.....	4	4	3	5	3	...	3	4	4	3	2	3	3	3	3	3	3	3	3	30
4 Fameuse.....	5	5	4	2	4	4	4	5	3	4	4	4	4	4	4	4	4	4	4	28
5 Jonathan.....	2	3	5	3	5	5	5	...	2	4	5	5	5	4	5	5	5	5	5	29
Scattering votes.																				
6 Some Beauty.....	...	...	...	...	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7 Wine (P. Redstreak).....	...	...	...	...	...	...	2	...	5	...	...	4	...	...	...	...	...	...	...	...
8 Grimes's Golden.....	...	...	...	...	...	...	4	...	...	...	...	...	...	...	...	...	...	...	...	...
9 Chenango.....	...	...	...	...	...	...	5	...	...	...	...	...	...	...	...	...	...	...	...	...
10 Wagener.....	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	2	...	...

## WINTER APPLES.

1 Ben Davis.....	1	1	1	2	1	3	1	4	1	3	1	2	1	4	1	2	1	1	4	1	1	30
2 Winsap.....	2	2	2	4	2	2	1	6	2	2	2	2	2	2	2	2	2	2	2	2	2	31
3 Missoury Pippin.....	3	3	3	3	3	1	3	2	2	3	1	3	3	3	3	3	3	3	3	3	3	31
4 Rawle's Genet.....	5	5	4	1	4	4	4	3	5	4	5	4	4	4	1	7	4	4	4	4	4	30
5 Jonathan.....	4	4	5	5	5	5	5	5	4	5	5	5	5	5	5	5	5	5	5	5	5	30
6 Willow Twig.....	7	6	6	6	6	6	6	4	10	6	6	6	6	6	6	6	6	6	6	6	6	30
7 Smith's Cider.....	8	7	7	7	7	7	7	7	8	7	7	7	7	7	7	7	7	7	7	7	7	31
8 Rome Beauty.....	6	8	8	8	8	8	8	7	8	8	8	8	8	8	8	8	8	8	8	8	8	30
9 Gilpin.....	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	26
10 Dominic.....	10	10	10	10	10	10	10	...	6	10	10	10	10	10	9	10	10	9	2	10	6	28
<i>Scattering votes.</i>																						
11 W. W. Pearmain.....	...	...	...	8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12 Fink.....	...	...	...	...	...	...	...	8	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13 Roman Stem.....	...	...	...	...	...	...	...	...	9	...	...	...	...	...	...	...	...	...	...	...	...	...
14 Grimes's Golden.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	9	...	...	...	...	...	...	...
15 Baldwin.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	...	...	...
16 West'd S'k-no-fthr.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	...	...	...	...	...	...
17 Stark.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	9	...	...	...	...	...
18 Minkler.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	10	...	...	...	...	...
19 York Imperial.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	10	...	...	...



## NORTHERN FRUIT DISTRICT—CONTINUED.

Varieties, arranged in the order of preference.		CRAB APPLES.																					
		Albion.....	Cloud.....	Clay.....	Dickinson.....	Davis.....	Jefferson.....	Jackson.....	Jewell.....	Lincoln.....	Michell.....	Monahan.....	Osborne.....	Ottawa.....	Phillips.....	Pottawomac.....	Riley.....	Republic.....	Shawnee.....	Saline.....	Wyandotte.....	Washington.....	Totals.....
1	Transcendent.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	30
2	Hyslop.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21
3	Whitney's No. 20.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21
4	Yellow Siberian.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21
5	Golden Beauty.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21
<i>Scattering votes.</i>																							
	Late Winter.....						5																5
	Soulard.....																						
	Lady Elgin.....																	1					1
	Alaska.....																						
	Martha.....																						

## APRIOTS.\*

1 Moorpark	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2 Breda	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3 Early Golden	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4 Royal	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5 Russian, named var.	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

## CHERRIES.\*

<i>Early.</i>																					
1 Early Richmond	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2 May Duke	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3 Luelling	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4 Governor Wood	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5 Leib	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
6 Montmorency			3								4									2	
7 Dyehouse																				3	
<i>Late.</i>																					
1 English Morello	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2 Common Morello	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3 Belle Magnifique	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4 Oathelm	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5 Late Richmond	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

## PEACHES.

<i>Early.</i>																					
1 Amaden	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2 Alexander	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3 Hale's	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4 Large Early York	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5 Crawford's Early	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
6 Coolidge [Favorite]								3													
<i>Medium.</i>																					
1 Stump the World	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2 Crawford's Early	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3 Old Mixon Free	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4 Old Mixon Cling	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5 George the Fourth	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
6 Barnard								2													
7 Sturtevant																				1	
8 Crawford's Late																					
<i>Late.</i>																					
1 Heath Cling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2 Crawford's Late	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3 Snock	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4 Salway	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5 Ward's Late	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
6 Dean's Orange																				1	

\*No report from Jefferson county on apricots, and but one on early cherries.

[illegible]

\* No report. † Not successful.

## NORTHERN FRUIT DISTRICT—CONTINUED.

		BLACKBERRIES.																						
Varieties, arranged in the order of preference.		Atchison.....	Cloud.....	Clay.....	Dickinson.....	Davis.....	Jefferson.....	Jackson.....	Jewell.....	Lincoln.....	Mitchell.....	Nemaha.....	Osborne.....	Ottawa.....	Phillips.....	Pottawatomie.....	Riley.....	Republic.....	Shawnee.....	Saline.....	Wendell.....	Wichita.....	Total.....	
<i>Early.</i>																								
1	Kittatinny.....	2		3			1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	
2	Early Harvest.....	1	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	
3	Taylor.....	3	3	3	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
4	Early Cluster.....	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
5	Brunton [Early].....	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
<i>Late.</i>																								
1	Snyder.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2	Kittatinny.....	2	2	2	5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
3	Lawton.....	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
4	Taylor.....	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
5	Stone [Hardy].....	4	5	5	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	

## CURRENTS.

1 Red Dutch	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2 Cherry	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3 White Grape	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4 White Dutch	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5 Fay [Prolific]	5	5	5	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
6 Missouri Black	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

## GOOSEBERRIES.

1 Houghton	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2 Downing	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3 Smith	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4 Pale Red	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5 Mountain	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

## RASPBERRIES.\*

BLACKCAPS.																							
<i>Early.</i>																							
1 Doolittle	1	2	1	2	1	1	1	1	1	4	1	1	1	1	1	1	1	1	1	1	1	1	1
2 Souhegan	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3 Hopkins	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4 Tyler	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5 Davison's (th'rless)	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
<i>Medium.</i>																							
1 Miami	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2 Seneca	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3 Canada Black	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4 Hixon's Everbearer	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5 Ohio	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
<i>Late.</i>																							
1 Gregg	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2 McCormick	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3 Hixon's Everbearer	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
RED VARIETIES.																							
<i>Early.</i>																							
1 Turner	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2 Hansell	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3 Marlboro	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4 Philadelphia	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5 Cuthbert	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
<i>Medium and Late.</i>																							
1 Cuthbert	1	1	1	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2 Thwack	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3 Reliance	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4 Shaffer (Colossal)	4	4	4	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5 Brandywine	5	5	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

\*No report from Pottawatomie county of early and medium varieties of blackcaps, and medium and late red varieties.

## NORTHERN FRUIT DISTRICT—CONCLUDED.

Varieties, arranged in the order of preference.		STRAWBERRIES.*																				Totals.....	
		Atchison.....	Cloud.....	Clay.....	Dickinson.....	Davis.....	Jefferson.....	Jackson.....	Jewell.....	Lincoln.....	Michell.....	Nemaha.....	Oskotone.....	Phillips.....	Pottawatomie.....	Riley.....	Republic.....	Shawnee.....	Saline.....	Wyandotte.....	Washington.....		
<i>Early.</i>																							
1	Crescent.....P.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	30	
2	Charles Downing..H.	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	30	
3	Bidwell.....H.	3	4	3	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	30	
4	Sharpless.....H.	4	2	4	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	30	
5	Colonel Cheney....P.	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	29	
6	Parry.....H.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
<i>Medium.</i>																							
1	Wilson.....H.	1	1	1	...	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	29
2	Captain Jack.....H.	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	30
3	Sharpless.....H.	3	3	3	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	30
4	James Vick.....H.	4	4	4	...	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	30
5	Old Ironclad.....H.	5	5	5	...	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	27
6	Manchester.....P.	...	...	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	Miner (Prolific)....H.	...	...	5	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	
8	Champion.....P.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	...	...	
<i>Late.</i>																							
1	Kentucky.....H.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	30
2	Glendale.....P.	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	30
3	Cumberland.....H.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	30
4	Miner (Prolific)....H.	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	30
5	Manchester.....P.	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	30

\* The letter "P" following a name indicates the female sex (pistillate); "H" hermaphrodite, or bisexual. All the latter class are self-fertilizers, while the former require the aid of some one of the latter to render them fruitful.

† No report.



MARKET ORCHARD.—Varieties, arranged in the order of highest vote for place indicated in the list.		AUTUMN APPLES—concluded.															
		Anderson	Barton	Coffey	Chase	Douglas	Johnson	Harvey	Linn	Lyon	Mami	Marion	McPherson	Osgood	Rice	Reed	Tobacco
	<i>Scattering votes.</i>																
6	Chenango.....	8				2											
7	Rome Beauty.....			2													
8	Trenton Early.....					4											
9	Holland Pippin.....					8											
10	Grimes's Golden.....										9				4		

1	Ben Davis.....	3	1	1	1	1	...	1	1	1	1	1	1	3	1	1	...	1	18
2	Missouri Pippin.....	2	3	3	2	2	2	2	2	2	2	2	2	...	2	2	2	2	19
3	Winesap.....	1	2	2	3	3	5	3	3	3	3	3	3	2	3	3	3	3	20
4	Rawle's Genet.....	4	4	4	4	4	4	4	4	4	4	4	5	4	4	4	4	4	20
5	Willow Twig.....	7	5	5	5	5	3	5	5	5	5	5	5	3	5	5	5	5	6
6	Jonathan.....	6	6	6	6	6	6	6	6	6	6	6	6	...	6	6	6	6	7
7	Smith's Cider.....	5	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	8
8	Rome Beauty.....	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	9
9	Glipin.....	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	5
10	York Imperial.....	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...
<i>Scattering votes.</i>																			
11	Smokehouse.....	...	...	...	...	...	9	...	...	...	...	...	...	...	...	...	...	...	...
12	Grimes' Golden.....	...	...	...	...	...	...	...	...	...	...	6	...	...	...	...	...	...	...
13	Newtown Spitzenburg.....	...	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...	...	...
14	Red Winter Pearmain.....	...	...	...	...	...	...	...	...	...	...	...	...	...	9	...	...	...	...
15	Dominie.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...

[illegible][illegible][illegible]



**CENTRAL FRUIT DISTRICT—CONTINUED.**

[illegible]

**PEACHES.**

[illegible]

**PEARS.**

[illegible]

## CENTRAL FRUIT DISTRICT—CONTINUED.

Varieties, arranged in the order of preference.		PEARS—concluded.														
		Anderson	Barton	Coffey	Chase	Douglas	Johnson	Linn	Lyon	Miami	Marion	McPherson	Oaage	Rice	Waukegan	Totals
<i>Medium.</i>																
1	Bartlett.....	1	1	1	1	1	1	2	1	1	1	1	1	1	1	20
2	Flemish Beauty.....	2	2	2	2	2	2	3	2	2	2	2	2	2	2	19
3	Howell.....	3	3	3	3	3	3	4	3	3	3	3	3	3	3	30
4	Louise Bonne de Jersey.....	4	4	4	4	4	4	5	4	4	4	4	4	4	4	19
5	Kieffer.....	5	5	5	5	5	5	5	5	5	5	5	5	5	5	17
6	Angouleme.....	...	...	...	...	...	...	1	...	5	3	...	...	...	...	...
<i>Late.</i>																
1	Vicar.....	1	1	1	1	1	1	1	1	1	...	1	1	1	1	19
2	Seckel.....	2	2	2	2	2	2	2	2	2	...	2	2	2	2	19
3	Winter Nellis.....	3	3	3	3	3	3	3	3	3	1	3	3	3	3	40
4	Lawrence.....	4	4	4	4	4	4	4	4	4	...	4	4	4	4	18
5	Easter Buerre.....	5	5	5	5	5	5	5	5	5	...	5	5	5	5	19
6	Anjou (Buerre de).....	...	...	...	...	...	4	...	...	...	...	...	...	...	...	...
7	Malines.....	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...
PLUMS.																
1	Wild Goose.....	1	1	1	1	1	1	1	1	1	1	1	1	1	2	20
2	Miner.....	2	2	2	2	2	2	2	2	2	2	2	2	2	1	19
3	Sand.....	3	3	3	3	3	3	3	3	3	2	3	3	3	3	30
4	Damson.....	4	4	4	4	4	4	4	4	4	...	4	4	4	4	18
5	Lombard.....	5	5	5	5	5	5	5	5	5	...	5	5	5	5	18
6	Chickasaw.....	6	6	6	6	6	6	6	6	6	...	6	6	6	6	19
7	Weaver.....	7	7	7	7	7	7	7	7	7	...	7	7	7	7	19
8	De Soto.....	...	...	...	4	...	...	...	...	...	...	...	...	...	...	...
9	Ogden.....	...	...	...	5	...	...	...	...	...	...	...	...	...	...	...
QUINCES.																
1	Apple.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	120
2	Champion.....	2	2	2	2	2	2	2	2	2	2	2	2	2	2	220
3	Angers.....	3	3	3	3	3	3	3	3	3	3	3	3	3	3	820
4	Missouri Mammoth.....	4	4	4	4	4	4	4	4	4	4	4	4	4	4	420
5	Rea (Mammoth).....	5	5	5	5	5	5	5	5	5	5	5	5	5	5	520
BLACKBERRIES.																
<i>Early.</i>																
1	Kittatinny.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	120
2	Early Harvest.....	2	2	2	2	2	2	2	2	2	2	2	2	2	2	19
3	Wilson Jr.....	3	3	3	3	3	3	3	3	3	3	3	3	3	3	19
4	Brunton (Early).....	4	4	4	4	4	4	4	4	4	...	4	4	4	4	19
5	Lawton (New Rochelle).....	5	5	5	5	5	5	5	5	5	...	5	5	5	5	19
<i>Late.</i>																
1	Snyder.....	1	1	1	1	1	1	1	1	1	1	3	1	1	1	120
2	Lawton.....	2	2	2	2	2	2	2	2	2	...	2	2	2	2	19
3	Kittatinny.....	3	3	3	3	3	3	3	3	3	2	3	3	3	3	220
4	Western Triumph.....	4	4	4	4	4	4	4	4	4	...	4	4	4	4	19
5	Taylor.....	5	5	5	5	5	5	5	5	5	...	5	5	5	5	19
6	Erle.....	...	...	...	...	...	...	...	...	3	...	...	...	...	...	...
CURRANTS.																
1	Red Dutch.....	1	1	1	1	1	1	1	2	1	...	1	1	1	1	19
2	White Grape.....	2	2	2	2	2	2	2	2	2	1	2	2	2	2	320
3	Cherry.....	3	3	3	3	3	3	3	3	3	...	3	3	3	3	219
4	White Dutch.....	4	4	4	4	4	4	4	4	4	...	4	4	4	4	19
5	Fay (Prolific).....	5	5	5	5	5	5	5	5	5	...	5	5	5	5	18
6	Rocky Mountain Black.....	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...
GOOSEBERRIES.																
1	Houghton.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	820
2	Downing.....	2	2	2	2	2	2	2	2	2	...	2	2	2	2	19
3	Smith's (Improved).....	3	3	3	3	3	3	3	3	3	...	3	3	3	3	219
4	Mountain.....	4	4	4	4	4	4	4	4	4	2	4	4	4	4	420
5	Crown Bob.....	5	5	5	5	5	5	5	5	5	...	5	5	5	5	19
6	White Smith.....	6	6	6	6	6	6	6	6	6	...	6	6	6	6	19
7	Pale Red.....	7	7	7	7	7	7	7	7	7	...	7	7	7	7	19



## CENTRAL FRUIT DISTRICT—CONCLUDED.

Varieties, arranged in the order of preference.		RASPBERRIES.																Totals.....
		Wainman.....	Reno.....	Rice.....	Orange.....	McPherson.....	Miami.....	Lyon.....	Linn.....	Harvey.....	Johnson.....	Douglas.....	Chase.....	Coffey.....	Barton.....	Anderson.....		
BLACKCAPS.																		
Early.																		
1	American Black (Doolittle).....	4	1	1	1	5	2	1	1	1	1	1	1	1	1	1	1	119
2	Souhegan.....	3	2	2	1	1	1	2	2	2	2	2	2	2	2	2	2	219
3	Tyler.....	1	3	3	3	2	3	3	3	3	2	3	1	4	3	3	3	320
4	Davison (Thornless).....	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	419
5	Hopkins.....	2	5	5	5	3	5	5	5	5	5	5	5	5	5	5	5	519
Medium.																		
1	McCormick.....	1	1	2	1	...	1	1	1	1	1	1	1	1	1	1	1	218
2	Gregg.....	2	2	1	2	2	2	2	2	2	2	2	1	2	2	2	2	120
3	Miami.....	3	3	3	3	...	3	3	3	3	3	3	3	3	3	3	3	318
4	Smith.....	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	419
5	Ohio.....	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...
6	Centennial.....	...	...	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...
Late.																		
1	Gregg.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	120
2	McCormick.....	2	2	2	2	...	2	2	2	2	2	2	1	2	2	2	2	218
3	Nemaha.....	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...
4	Shaffer (Colossal).....	...	...	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...
RED VARIETIES.																		
1	Turner.....	1	1	1	1	...	1	1	1	1	3	1	...	1	1	1	1	117
2	Philadelphia.....	3	2	2	2	4	2	2	2	2	2	2	...	2	2	2	2	119
3	Cuthbert.....	2	3	3	3	3	3	3	3	3	1	3	1	3	3	3	3	220
4	Thwack.....	4	4	4	4	2	4	4	4	4	4	4	4	4	4	4	4	419
5	Hansell.....	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	319
6	Shaffer (Colossal).....	...	...	...	1	...	...	...	...	...	...	2	...	...	...	...	...	...
STRAWBERRIES.*																		
Early.																		
1	Crescent.....	P.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	120
2	H. ....	H.	3	2	2	2	2	2	2	2	2	3	2	1	2	2	3	120
3	Charles Downing.....	H.	2	3	3	3	3	3	3	3	3	3	3	2	3	3	3	220
4	Sharpless.....	H.	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	319
5	Downer (Prolific).....	H.	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	419
Medium.																		
1	Captain Jack.....	H.	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	320
2	Charles Downing.....	H.	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	120
3	Sharpless.....	H.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	219
4	Wilson.....	H.	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	419
5	Jewell.....	P.	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	519
6	Green Prolific.....	P.	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	619
7	Triomphe de Gand.....	H.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Late.																		
1	Kentucky.....	H.	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	119
2	Glendale.....	P.	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	219
3	Cumberland.....	H.	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	219
4	Miner (Prolific).....	H.	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	319
5	Jumbo.....	H.	7	5	5	5	5	5	5	5	5	5	2	5	5	5	5	520
6	Mount Vernon.....	H.	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	619
7	Champion.....	P.	1	7	7	7	7	7	7	7	7	7	7	7	7	7	7	719
8	Wilson.....	H.	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	819
9	Jersey Queen.....	P.	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...

## STRAWBERRIES.\*

<i>Early.</i>																		
1	Crescent	P.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1 20
2	Wilson	H.	3	2	2	2	2	2	2	2	2	3	2	2	2	2	3	3 19
3	Charles Downing	H.	2	3	3	3	3	3	3	3	2	3	2	3	3	3	2	2 20
4	Sharpless	H.	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3 19
5	Downer (Prolific)	H.	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4 19
<i>Medium.</i>																		
1	Captain Jack	H.	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	3 20
2	Charles Downing	H.	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	1 20
3	Sharpless	H.	3	3	3	3	3	3	3	3	3	3	...	3	3	3	3	2 19
4	Wilson	H.	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4 19
5	Jewell	P.	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5 19
6	Green Prolific	P.	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6 19
7	Triomphe de Gand	H.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
<i>Late.</i>																		
1	Kentucky	H.	3	1	1	1	1	1	1	1	1	1	...	1	1	1	1	1 19
2	Glendale	P.	2	2	2	2	2	2	2	2	2	2	...	2	2	2	2	2 19
3	Cumberland	H.	5	3	3	3	3	3	3	3	3	3	...	3	3	3	3	3 19
4	Miner (Prolific)	H.	4	4	4	4	4	4	4	4	4	4	...	4	4	4	4	3 19
5	Junbo	H.	7	5	5	5	5	5	5	5	5	5	2	5	5	5	5	5 20
6	Mount Vernon	H.	6	6	6	6	6	6	6	6	6	6	...	6	6	6	6	6 19
7	Champion	P.	1	7	7	7	7	7	7	7	7	7	...	7	7	7	7	7 19
8	Wilson	H.	8	8	8	8	8	8	8	8	8	8	...	8	8	8	8	8 19
9	Jersey Queen	P.	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...

\* The letter "P" following a name indicates the female sex (pistillate); "H" hermaphrodite, or bi-sexual plant. All such are self-fertilizers, and need no help from other sorts to become fruitful, while the first require plants of the latter near them for fertilizing purposes.

**FAMILY ORCHARD.**—Varieties, arranged in the list in the order of the highest vote for the place they occupy.

### AUTUMN APPLES.

### WINTER APPLES.

### MARKET ORCHARD.

### AUTUMN APPLES.

[illegible]

**SOUTHERN FRUIT DISTRICT—CONTINUED.**

MARKET ORCHARD.—Varieties, arranged in the order of preference.		AUTUMN APPLES—concluded.													
		Allen.....	Butler.....	Crawford.....	Cowley.....	Chautauque...	Charolée.....	Elk.....	Harper.....	Labelle.....	Montgomery..	Summer.....	Sedgwick.....	Woodson.....	Totals.....
	<i>Scattering votes.</i>														
6	Western Beauty.....	2													
7	Autumn Swaar.....	5													
8	Grimes's Golden.....		8												
9	Wine.....				3										
10	Golden Sweet.....			5		4									

### WINTER APPLES.

1	Ben Davis.....	1	3	2	1	1	3	1	1	1	1	1	1	1	1	1	1	19
2	Winesap.....	2	2	3	2	2	2	6	2	2	2	2	3	3	3	3	2	19
3	Missouri Pippin.....	2	1	1	3	3	1	3	3	3	3	4	3	2	2	3	2	5
4	Rawle's Genet.....	4	5	4	4	4	....	4	....	4	....	4	5	4	6	4	4	16
5	Rome Beauty.....	5	4	5	5	....	5	5	5	5	5	5	5	4	5	8	5	18
6	Willow Twig.....	6	6	6	6	5	7	6	2	4	6	6	7	6	7	10	6	19
7	Smith's Cider.....	7	7	7	7	6	8	7	7	6	7	7	7	8	7	7	7	19
8	Jonathan.....	8	8	8	8	7	9	8	8	7	8	8	8	2	8	7	8	18
9	Gilpin.....	9	9	9	9	10	9	8	9	9	9	9	9	9	9	9	9	18
10	White Winter Pearmain.....	10	10	10	....	6	10	10	9	10	10	10	10	10	8	....	10	15
<i>Scattering votes.</i>																		
11	White Pippin.....	9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
12	York Imperial.....	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
13	Kansas Keeper.....	....	....	....	....	4	....	....	....	....	....	....	....	....	....	....	....	....
14	Michael Henry Pippin.....	....	....	....	....	....	....	....	....	....	4	....	....	....	....	....	....	....
15	Limber Twig.....	....	....	....	....	....	....	....	....	....	....	....	....	8	....	....	....	....

### CRAV APPLES.

[illegible]

**APRICOTS.\***

[illegible]

**CHERRIES.†**

	<i>Early.</i>																			
1	Early Richmond.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	May Duke.....	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3	Montmorency.....	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4	Early Purple.....	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5	Leib.....	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
6	Elton.....	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
7	Governor Wood.....	...	...	...	...	6	...	...	...	...	...	...	...	...	...	...	...	3	...	...
8	Black Tartarian.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	...	...
	<i>Medium.</i>																			
1	Governor Wood.....	1	1	1	1	1	1	1	1	1	1	5	1	1	4	...	...	1	...	...
2	Olivet.....	2	2	2	2	2	2	2	2	2	2	2	2	2	2	...	...	2	...	...
3	Eugenia.....	3	3	3	3	3	3	3	3	3	3	3	3	3	3	...	...	3	...	...
4	Reine Hortense.....	4	4	4	4	4	4	4	4	4	4	4	4	4	4	1	...	4	...	...
5	Montmorency.....	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	...	5	...	...
6	Belle De Choisy.....	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	...	6	...	...

\* Cowley county, not recommended. † Woodson county, worthless.

† Sedgwick county, no report for medium.

## SOUTHERN FRUIT DISTRICT—CONTINUED.

Varieties, arranged in the order of preference.		CHERRIES — concluded.													
		Allen	Butler	Crawford	Cowley	Chautauque	Cherokee	Elk	Harper	Labelle	Montgomery	Nummer	Sedgwick *	Woodson	Totals
1	English Morello.....	1	1	1	1	1	1	1	1	1	1	1	2	1	1
2	Common Morello.....	2	2	2	2	2	2	2	2	2	2	2	1	2	2
3	Belle Magnifique.....	3	3	3	3	3	3	3	3	3	3	3	4	3	3
4	Late Montmorency.....	4	4	4	4	4	4	4	4	4	4	4	8	4	4

## PEACHES.

<i>Early.</i>		1	1	1	1	1	2	1	2	1	1	1	2	1	1	1	16
1	Amsden.....	1	1	1	1	1	2	1	2	1	1	1	2	1	1	1	16
2	Alexander.....	2	2	2	2	2	1	2	2	2	2	2	2	1	2	2	216
3	Hale's.....	3	3	3	3	3	3	3	3	3	3	3	3	8	2	3	317
4	Early York.....	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	417
5	Early Rivers.....	5	5	5	5	5	4	5	5	5	5	5	5	7	5	5	517
6	Crawford's Early.....	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	616
7	Troth's Early.....	7	7	7	7	7	7	7	7	7	7	7	7	7	6	7	717
8	Governor Garland.....	8	8	8	8	8	6	8	8	8	8	8	8	5	8	5	16
9	Acme.....	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
10	Early Louise.....	10	10	10	10	10	10	10	10	10	10	10	10	3	10	3	3
11	Mountain Rose.....	11	11	11	11	11	11	11	11	11	11	11	11	8	11	8	8
<i>Medium.</i>		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17
1	Old Mixon Free.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17
2	Stump the World.....	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	217
3	Large Early York.....	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	317
4	Lemon Clingstone.....	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	417
5	Foster.....	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	517
6	George the Fourth.....	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	617
7	Chinese Cling.....	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	716
8	Morris White.....	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	717
9	Early York.....	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	17
<i>Late.</i>		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17
1	Heath Cling.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17
2	Crawford's Late.....	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	217
3	Stedly.....	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	317
4	Ward's Late.....	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	417
5	Indian Blood Cling.....	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	516
6	Heath Free.....	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	617
7	Old Mixon Cling.....	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	717
8	Levy.....	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8

## PEARS.

<i>Early.</i>		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17
1	Early Harvest.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17
2	Osband's Summer.....	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	217
3	Madeleine.....	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	316
4	Summer Doyenne.....	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	417
5	Seedless.....	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	15
6	Gifford.....	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
<i>Medium.</i>		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17
1	Bartlett.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17
2	Flemish Beauty.....	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	216
3	Louise Bonne de Jersey.....	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	317
4	Clapp's Favorite.....	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	417
5	Howell.....	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	517
6	Seckel.....	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
<i>Late.</i>		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17
1	Vicar.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17
2	Lawrence.....	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	217
3	Angouleme.....	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	317
4	Winter Nellis.....	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	416
5	Sheldon.....	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	517
6	Kieffer.....	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6

\* No report.

## SOUTHERN FRUIT DISTRICT—CONTINUED.

Varieties, arranged in the order of preference.		PLUMS.														Total.
		Allen.	Butler.	Crawford.	Cowley.	Chautauque.	Cheokee.	Elk.	Harper.	Labelle.	Montgomery.	Sumner.	Sedgwick.	Woodson.		
1	Wild Goose.....	1	1	2	1	2	2	1	1	1	1	1	1	1	1	17
2	Miner.....	2	2	1	2	2	1	2	2	2	2	2	2	4	2	217
3	Chickasaw.....	3	3	3	3	3	3	3	3	3	3	3	3	5	3	316
4	Weaver.....	4	4	4	4	4	4	4	4	4	4	4	4	4	4	416
5	Blue Damsen.....	5	5	5	5	5	5	5	5	5	5	5	5	8	5	517
6	Blackman.....	5	5	5	5	8	5	5	5	5	5	5	5	5	5	517
7	Forest Garden.....	5	5	5	5	5	5	5	5	5	5	5	5	2	5	517
QUINCES.																
1	Apple (Orange).....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17
2	Champion.....	2	2	2	2	2	2	2	2	2	2	2	2	2	2	217
3	Portugal.....	3	3	3	3	3	3	3	3	3	3	3	3	3	3	317
4	Angers.....	4	4	4	4	4	4	4	4	4	4	4	4	4	4	417
5	Rea (Mammoth).....	5	5	5	5	5	5	5	5	5	5	5	5	5	5	517
GRAPES.																
Early.																
1	Moore's Early.....	1	1	1	1	1	1	1	1	1	1	1	1	2	1	116
2	Hartford (Prolific).....	2	2	2	2	2	2	2	2	2	2	2	2	2	2	215
3	Cynthiana.....	3	3	3	3	3	3	3	3	3	3	3	3	3	3	316
4	Lindley.....	4	4	4	4	4	4	4	4	4	4	4	4	4	4	416
5	Champion.....	5	5	5	5	5	5	5	5	5	5	5	5	5	3	516
6	Dracut Amber.....	2	1													2
7	Lady.....	3														
8	Agawam.....	4														
Medium.																
1	Concord.....	1	1	1	1	1	1	1	1	1	1	1	1	2	1	117
2	Elvira.....	2	2	2	2	2	2	2	2	2	2	2	2	2	2	216
3	Delaware.....	3	3	3	3	2	3	3	3	3	3	3	3	3	6	316
4	Martha.....	4	4	4	3	5	4	4	4	4	4	4	4	4	4	417
5	Isabella.....	5	5	5	5	4	6	5	5	5	5	5	5	5	7	516
6	Brighton.....	6	6	6	6	5	6	6	6	6	6	6	6	6	8	615
7	Prentiss.....	7	7	7	7	6	7	7	7	7	7	7	7	7	9	715
8	Pocklington.....	8	8	8	8	7	8	8	8	8	8	8	8	8	3	815
9	Iona.....	9	9	9	9	9	9	9	9	9	9	9	9	9	10	915
10	Wildor.....	10	10	10	10	8	10	10	10	10	10	10	10	10	11	1016
11	Worden.....	11	11	11	11	9	11	11	11	11	11	11	11	11	1	1116
12	Salem.....	8														
13	Ives.....	2														
Late.																
1	Dracut Amber.....	1	1	1	1	1	1	1	1	1	1	1	1	4	1	14
2	Clinton.....	2	2	2	2	2	2	2	2	2	2	2	2	2	2	217
3	Goethe.....	3	3	3	3	3	3	3	3	3	3	3	3	3	3	317
4	Ives.....	4	4	4	4	4	4	4	4	4	4	4	4	4	6	417
5	Norton.....	5	5	5	5	5	5	5	5	5	5	5	5	5	3	517
6	Herbemont.....	6	6	6	6	6	6	6	6	6	6	6	6	6	7	616
7	Agawam.....	7	7	7	7	7	7	7	7	7	7	7	7	7	7	716
8	Salem.....	8	8	8	8	8	8	8	8	8	8	8	8	8	9	816
9	Catawba.....	9	9	9	9	9	9	9	9	9	9	9	9	9	1	916
10	Niagara.....	1														
11	Noah.....															3
BLACKBERRIES.																
Early.																
1	Kittatinny.....	1	1	1	1	1	1	1	1	1	1	1	1	2	1	117
2	Early Harvest.....	2	2	2	2	2	2	2	2	2	2	2	2	3	3	216
3	Wilson's Early.....	3	3	3	3	2	3	3	3	3	3	3	3	3	4	317
4	Taylor (Prolific).....	4	4	4	4	3	4	4	4	4	4	4	4	4	2	416
5	Roles's Early.....	1														
Late.																
1	Snyder.....	1	1	1	1	2	1	1	1	2	1	1	2	1	3	116
2	Lawton.....	2	2	2	2	1	3	2	2	3	2	2	2	2	2	217
3	Kittatinny.....	3	3	3	3	2	1	3	3	1	3	3	3	3	1	317
4	McCracken.....	4	4	4	4	3	4	4	4	4	4	4	4	4	4	417
5	Taylor.....	5	5	5	5	4	5	5	5	5	5	5	5	5	5	517

\* No report.

## SOUTHERN FRUIT DISTRICT—CONTINUED.

Varieties, arranged in the order of preference.		CURRANTS.													
		Allen.....	Butler.....	Crawford.....	Cowley.....	Chauniqua.....	Cherokee.....	Elk.....	Harper.....	Labelle.....	Montgomery.....	Summer.....	Sedgwick*.....	Woodson.....	Total.....
1	Red Dutch.....	1	1	1	1	1	1	1	1	1	1	1	1	1	17
2	White Dutch.....	2	2	2	2	2	2	2	2	2	2	2	2	2	17
3	Cherry.....	3	3	3	3	3	3	3	3	3	3	3	3	3	17
4	White Grape.....	4	4	4	4	4	4	4	4	4	4	4	4	4	17
5	Fay (Prolific).....	5	5	5	5	5	5	5	5	5	5	5	5	5	16
6	Black Naples.....	6	6	6	6	6	6	6	6	6	6	6	6	6	16
7	Versailles.....	7	7	7	7	7	7	7	7	7	7	7	7	7	16
8	Lee's Prolific.....	8	8	8	8	8	8	8	8	8	8	8	8	8	16
9	Crandall.....				8										16

## GOOSEBERRIES.

1	Houghton.....	1	1	1	1	1	1	1	1	1	1	2	1	1	17
2	Downing.....	2	2	2	2	2	2	2	2	2	2	2	2	2	17
3	Smith's (Improved).....	3	3	3	3	3	3	3	3	3	3	3	3	3	17
4	Mountain.....	4	4	4	4	4	4	4	4	4	4	4	4	4	16
5	Pale Red.....	5	5	5	5	5	5	5	5	5	5	5	5	5	16
6	English.....	6	6	6	6	6	6	6	6	6	6	6	6	6	16
7	Industry.....	7	7	7	7	7	7	7	7	7	7	7	7	7	16

## RASPBERRIES.

BLACKCAPS.																		
<i>Early.</i>																		
1	Doolittle.....	1	1	1	1	2	1	1	1	1	1	1	2	1	16			
2	Tyler.....	2	2	2	2	3	2	2	2	2	2	2	6	...	2	17		
3	Souhegan.....	3	3	3	3	1	3	3	3	3	3	3	2	1	...	3	17	
4	Early Ohio.....	4	4	4	4	4	4	4	4	4	4	4	4	4	...	4	17	
5	Hopkins.....	5	5	5	5	5	5	5	5	5	5	5	5	5	...	5	17	
6	Davison (Thornless).....	6	6	6	6	6	6	6	6	6	6	6	6	6	...	6	16	
7	McCormick.....	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	...	
<i>Medium.</i>																		
1	McCormick.....	1	1	1	1	2	1	1	1	1	1	1	1	2	...	1	17	
2	Seneca.....	2	2	2	2	3	2	2	2	2	2	2	2	2	3	...	2	17
3	Ironclad.....	3	3	3	3	1	3	3	3	3	3	3	3	3	4	...	3	17
4	New Rochelle.....	4	4	4	4	4	4	4	4	4	4	4	4	4	5	...	4	17
5	Miami.....	5	5	5	5	5	5	5	5	5	5	5	5	5	1	...	5	17
<i>Late.</i>																		
1	Gregg.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	...	1	17
2	McCormick.....	2	2	2	2	2	2	2	2	2	2	2	2	2	2	...	2	17
RED VARIETIES.																		
<i>Early.</i>																		
1	Turner.....	1	2	1	1	1	1	1	1	1	1	1	1	1	...	1	17	
2	Philadelphia.....	2	2	2	2	2	2	2	2	2	2	2	2	2	...	2	17	
3	Hansell.....	3	3	3	3	3	3	3	3	3	3	3	3	3	...	3	17	
4	Marlboro.....	4	4	4	4	4	4	4	4	4	4	4	4	4	...	4	17	
<i>Late.</i>																		
1	Turner.....	1	2	1	1	1	1	1	1	1	1	2	1	1	...	1	17	
2	Brandywine.....	2	3	2	2	2	2	2	2	2	2	3	2	2	5	...	2	17
3	Shaffer (Colossal).....	3	1	3	3	3	3	3	3	3	3	1	3	3	...	3	17	
4	Cuthbert.....	4	4	4	4	4	4	4	4	4	4	4	4	4	3	...	4	17
5	Thwack.....	5	5	5	5	5	5	5	5	5	5	5	5	5	4	...	5	17
6	Reliance.....	6	6	6	6	6	6	6	6	6	6	6	6	6	6	...	6	16

## STRAWBERRIES.†

<i>Early.</i>														
1	Crescent.....P.	1	1	1	1	1	1	1	1	1	1	2	1	17
2	Charles Downing.....H.	2	2	2	2	2	2	2	2	2	2	1	2	17
3	Wilson's Albany.....H.	3	3	3	3	3	3	3	3	3	3	3	3	17
4	Captain Jack.....H.	4	4	4	4	4	4	4	4	4	4	4	4	17
5	Crystal City.....P.	5	5	5	5	5	5	5	5	5	5	5	5	17
6	Miner.....H.	6	6	6	6	6	6	6	6	6	6	6	6	17
7	Jumbo.....H.	7	7	7	7	7	7	7	7	7	7	7	7	17

\* No report.

† The letter "P" following a name indicates the female (pistillate); "H," hermaphrodite, or bisexual plant. All such are self-fertilizers, and need no help from other sorts to become fruitful, while the first require plants of the same name.

## SOUTHERN FRUIT DISTRICT—CONCLUDED.

Varieties, arranged in the order of preference.		STRAWBERRIES — concluded.											Total	
		Allen	Butler	Crawford	Cowley	Chautauqua	Cherokee	Elk	Harper	Labelle	Montgomery	Summer	Sedgwick*	Woodson
<i>Medium.</i>														
1	Charles Downing .....	H.	1	1	1	1	1	1	1	1	1	3	...	117
2	Captain Jack .....	H.	2	2	2	2	2	2	2	2	2	4	...	217
3	Wilson .....	H.	3	3	3	3	3	3	3	3	3	...	...	316
4	Cumberland .....	H.	4	4	4	4	4	4	4	4	4	2	...	417
5	Downer (Prolific) .....	H.	5	5	5	5	5	5	5	5	5	5	...	517
6	Truitt's Surprise .....	H.	6	6	6	6	6	6	6	6	6	6	...	16
7	Parry .....	H.	7	7	7	7	7	7	7	7	7	7	...	16
8	Sharpless .....	H.	8	8	8	8	8	8	8	8	8	8	...	16
9	Sucker State .....	H.	...	...	...	...	...	...	...	...	...	1	...	16
<i>Late.</i>														
1	Kentucky .....	H.	1	1	1	1	1	1	1	1	1	2	1	117
2	Glendale .....	P.	2	2	2	2	2	2	2	2	2	1	2	215
3	Champion .....	P.	3	3	3	3	3	3	3	3	3	3	...	317
4	Sharpless .....	H.	4	4	4	4	4	4	4	4	4	4	...	417
5	Mt. Vernon .....	H.	...	...	2	2	...	...	...	...	...	...	...	...

\* No report.



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